PB83-256206

Bulk Gasoline Terminals Background Information for Promulgated Standards

(U.S.) Environmental Protection Agency
Research Triangle Park, NC

Aug 83

U.S. Department of Commerce
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TECHNICAL REPORT DATA
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1. REPORT NO. EPA-450/3-80-038b	2.	3. RECIPIENT'S ACCESSION NO. PB83 256206
4. TITLE AND SUBTITLE Bulk Gasoline Terminals - Background Information for Promulgated Standards		5. REPORT DATE August 1983
		6. PERFORMING ORGANIZATION CODE
7. AUTHOR(S)		8. PERFORMING ORGANIZATION REPORT NO.
9. PERFORMING ORGANIZATION NAME AND ADDRESS Office of Air Quality Planning and Standards U.S. Environmental Protection Agency Research Triangle Park, NC 27711		10. PROGRAM ELEMENT NO.
		11. CONTRACT/GRANT NO. 68-02-3060
12. SPONSORING AGENCY NAME AND ADDRESS DAA for Air Quality Planning and Standards Office of Air, Noise, and Radiation U.S. Environmental Protection Agency Research Triangle Park, NC 27711		13. TYPE OF REPORT AND PERIOD COVERED
		14. SPONSORING AGENCY CODE EPA/200/04

15. SUPPLEMENTARY NOTES

16. ABSTRACT

Standards of performance to control volatile organic compound emissions from new, modified, and reconstructed bulk gasoline terminal loading racks are being promulgated under the authority of Section 111 of the Clean Air Act. This document contains a detailed summary of the public comments on the proposed standards (45 FR 83126), responses to these comments and a summary of the changes to the proposed standards.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
Air Pollution Pollution Control Standards of Performance Bulk Gasoline Terminals VOC	Air Pollution Control	13b

18. DISTRIBUTION STATEMENT Unlimited	19. SECURITY CLASS *(This Report)* Unclassified	21. NO. OF PAGES 186
	20. SECURITY CLASS *(This page)* Unclassified	22. PRICE

EPA Form 2220-1 (Rev. 4-77) PREVIOUS EDITION IS OBSOLETE

United States
Environmental Protection
Agency

Office of Air Quality
Planning and Standards
Research Triangle Park NC 27711

EPA-450/3-80-038b
August 1983

PB83-256206

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Bulk Gasoline Terminals— Background Information for Promulgated Standards

Final EIS

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INFORMATION SERVICE
U.S. DEPARTMENT OF COMMERCE
SPRINGFIELD, VA 22161

EPA-450/3-80-038b

Bulk Gasoline Terminals–Background Information for Promulgated Standards

Emission Standards and Engineering Division

U.S. ENVIRONMENTAL PROTECTION AGENCY
Office of Air, Noise, and Radiation
Office of Air Quality Planning and Standards
Research Triangle Park, North Carolina 27711

August 1983

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Publication No. EPA-450/3-80-038b

ENVIRONMENTAL PROTECTION AGENCY

Background Information
and Final
Environmental Impact Statement
for Bulk Gasoline Terminals

Prepared by:

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for Jack R. Farmer
Director, Emission Standards and Engineering Division
U.S. Environmental Protection Agency
Research Triangle Park, NC 27711

8-8-83
(Date)

1. The promulgated standards of performance will limit emissions of VOC from new, modified, and reconstructed bulk gasoline terminals. Section 111 of the Clean Air Act (42 U.S.C. 7411), as amended, directs the Administrator to establish standards of performance for any category of new stationary source of air pollution that ". . . causes or contributes significantly to air pollution which may reasonably be anticipated to endanger public health or welfare."

2. Copies of this document have been sent to the following Federal Departments: Labor, Health and Human Services, Defense, Transportation, Agriculture, Commerce, Interior, and Energy; the National Science Foundation; the Council on Environmental Quality; members of the State and Territorial Air Pollution Program Administrators; the Association of Local Air Pollution Control Officials; EPA Regional Administrators; and to other interested parties.

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1.0 SUMMARY

On December 17, 1980, the Environmental Protection Agency (EPA) proposed standards of performance for bulk gasoline terminals (45 FR 83126) under authority of Section 111 of the Clean Air Act. Public comments were requested on the proposal in the Federal Register. There were 40 commenters consisting mainly of terminal owners and operators, trade associations, State and local air pollution control agencies, and control equipment suppliers. Three U.S. Government agencies also commented on the proposed standards. The comments that were submitted, along with responses to these comments, are summarized in this document. The summary of comments and responses serves as the basis for the revisions made to the standards between proposal and promulgation.

1.1 SUMMARY OF CHANGES SINCE PROPOSAL

Several changes of varying importance have been made to the standards since proposal. Most of the changes were made in response to comments, but some of them were made for the sake of clarity or consistency. One of the most significant of the changes dealt with proposed Section 60.502(d), which required loadings of gasoline tank trucks to be restricted to vapor-tight tanks only, as evidenced by an annual vapor tightness test. Most of the comments on this requirement were concerned about the terminal operator's apparent liability for the condition of tank trucks owned by other parties. Several commenters felt that terminals would have to provide extra personnel at the loading racks to enforce this restriction (see Section 2.9.1 of this document). Section 60.502(d) (now 60.502(e)) was expanded to clearly delineate the terminal owner or operator's responsibilities and to clarify that on-the-spot monitoring of product loadings would not be necessary. A terminal operator need only compare a tank identification number against the file of vapor tightness documentation within 2 weeks after a loading of that tank took place. The terminal owner or operator would have to notify tank truck owners or operators loading nonvapor-tight tanks that reloading of the tank would not be allowed until the vapor-tightness documentation was received by the terminal. The terminal owner or operator would then be required to take steps to prevent loading into each such nonvapor-tight tank. Thus the final standard clarifies that a terminal owner or operator can comply with this part of the standard by cross-checking files and does not have to observe truck loading 24 hours per day.

One paragraph about facilities with existing vapor processing equipment was added to Section 60.502. The Agency has concluded that it is quite costly in light of the resulting emission reduction for an owner whose existing facility becomes subject to NSPS (e.g., through modification or reconstruction) to meet 35 mg/liter when the facility already has a system capable of meeting 80 mg/liter, but not 35 mg/liter. For these reasons, EPA has added Section 60.502(c), which permits affected facilities with such vapor control equipment to meet 80 mg/liter if construction or substantial rebuilding (i.e., "refurbishment") of that equipment commenced before the proposal date, December 17, 1980. This is based on the Administrator's judgment that best demonstrated technology (BDT) for these facilities is no further control, while BDT for facilities with vapor processing systems on which construction or refurbishment commenced after proposal is the replacement or add-on technology that would enable the facility to achieve 35 mg/liter.

Several commenters objected to the requirement for excess emissions reports and to using an average monitored value as the basis for an excess emissions determination (see Section 2.8.3 of this document). Section 60.504, Monitoring of Operations, has been reserved pending the development and promulgation of performance specifications for continuous monitoring devices. Therefore, specific comments concerning the proposed continuous monitoring requirements cannot be addressed at this time. The Agency is currently investigating several types of simple, low-cost monitors for various types of vapor processors.

After specifications have been selected, they will be proposed in a separate action in the Federal Register for public comment.

Two paragraphs of Section 60.505 requiring recordkeeping have been modified, and two new paragraphs have been added. Both tank truck vapor tightness documentation and monthly leak inspection records must still be kept on file at the terminal, but inspection records must now be kept for 2 years. New paragraph (d) of this section adds a 2-year recordkeeping requirement for the notifications now required under Section 60.502(e), and new paragraph (f) of this section adds a 3-year recordkeeping requirement for the costs for determining a refurbished vapor processing system.

One paragraph in Section 60.500 was deleted and another added. Since the continuous monitoring section has been reserved, the proposed Section 60.500(c), releasing the affected facility from the requirements of 60.504 until monitoring specifications had been developed, has been deleted. A new Section 60.500(c) has been added to change the applicability date from the date of proposal to the date of promulgation for existing facilities which commenced a component replacement program before the promulgation date in order to comply with State or local bulk terminal regulations. Such facilities are not subject to the standards by means of the reconstruction provisions of 40 CFR 60.15. Section 60.506 was added in response to commenters' concerns about the burden of accumulating records of replacements at an existing source, over its lifetime, for the purpose of determining reconstruction. The section also states that no records are required for small normal maintenance components that are routinely replaced and are a small part of the total cost.

The terminology used in the emission limits of the regulation has been changed since proposal. The emission limits are now expressed in terms of "total organic compounds" (TOC's) rather than VOC's (VOC's are the proportion of the organic compounds that is regarded as photochemically reactive). This change does not affect the stringency of the standards, but it does better reflect the intent of the standards and the data base and test procedures used in establishing the standards. The standards are intended to reduce emission of VOC's through the application of BDT (considering costs and other impacts), and the emission limits in the standards are selected to reflect the performance of BDT. However, the best demonstrated technologies applicable to bulk terminals do not selectively control VOC's, but rather all of the organic compounds contained in gasoline vapors. Furthermore, the emission limits are based on test data and test procedures that measure TOC, and the test methods used to determine compliance with the standards measure TOC. Therefore, to reflect accurately the performance of the control technologies selected as BDT and to be consistent with the data base and test methods on which the emission limits are based, the emission limits in the proposed standards should have been expressed in terms of total organic compounds, and the promulgated emission limits are expressed in those terms. Since the methane and ethane content is relatively small, the option to subtract this from measured TOC emissions using approved methods is retained.

Five definitions in Section 60.501 of the regulation were changed, and two were added. In response to industry comments (see Section 2.1.3 of this document), a size cutoff by gasoline throughput was added to the definition of "bulk gasoline terminal" (only facilities handling more than 76,700 liters, or 20,000 gallons, per day will be covered), to clarify that smaller facilities (bulk plants) served by ship or barge will not be covered by these standards. Also, the word "wholesale" has been removed because the throughput cutoff should exclude retail outlets (service stations) from possible applicability.

The definition for VOC is replaced by a definition of TOC to be consistent with the basis on which the emission limits were selected.

The wording of the definitions for "continuous vapor processing system" and "intermittent vapor processing system" was changed slightly to make the two terms consistent. The meanings of these terms remain the same.

The term "loading rack" was modified to include only the components whose replacement might be considered in a determination of construction, modification, or reconstruction. The change does not affect the basic meaning of the term or the designation of affected facility. Definitions for "existing vapor processing system" and "refurbishment" were added to clarify which processing systems would be required to meet the less stringent limit of 80 mg/liter.

Three paragraphs in Section 60.502 were modified. In paragraph (f), the word "recovery" was changed to "collection" to more precisely define the equipment contained on tank trucks.

The phrase "during product loading" was added in paragraph (i), to clarify that the delivery tank pressure limitation applies only while the tank is being filled at the terminal.

In proposed paragraph (i) (now 60.502(j)), the requirement to "visually" inspect the liquid and vapor handling systems on a monthly basis elicited a comment that vapor leaks are not effectively "seen" during an inspection (see Section 2.8.2). The word "visually" has been deleted to clarify that the inspection may be made without instruments, but that any of the senses may be used in detecting vapor or liquid leaks.

1.2 SUMMARY OF IMPACTS OF PROMULGATED ACTION

1.2.1 Alternatives to Promulgated Action

The regulatory alternatives are discussed in Chapter 6 of the Background Information Document for the proposed standards, "Bulk Gasoline Terminals - Background Information for Proposed Standards," EPA-450/3-80-038a [hereinafter referred to as BID, Volume I] (III-B-1). These regulatory alternatives reflect the different levels of emission control from which is selected the approach that represents the best demonstrated technology of continuous emission reduction, considering costs, nonair quality health, and environmental and economic impacts for bulk gasoline terminals. These alternatives remain the same.

1.2.2 Environmental Impacts of Promulgated Action

The estimated environmental impacts of the proposed standards were discussed in Chapter 7 of BID, Volume I. Changes in these estimates have been made since proposal, due to a reconsideration of one of the emission factors used to calculate emission reductions under the standards (see Section 2.4.2) and due to limiting of emissions to 80 mg/liter for existing vapor processing systems. Nationwide VOC emissions from affected bulk terminals will decrease by 5,700 Mg/year, or about 68 percent, from baseline SIP levels in the fifth year following promulgation of the standards. This emissions decrease will result in a reduction of ambient air concentrations of volatile organic compounds in the vicinity of new, modified, and reconstructed bulk gasoline terminals. Only very few thermal oxidation systems are expected to be installed, and so emissions of CO and NO_x from these systems will be negligible.

The water pollution impact will be minimal because water is not used as a direct control medium in any of the control technologies considered for the standard. Refrigeration type control systems discharge a small amount of condensed water from which recovered gasoline has been decanted. This minimal quantity of water will enter the terminal's drainage system and is not expected to represent a significant percentage of the total discharge of the terminal.

Carbon adsorption type control systems could produce a small amount of solid waste if the activated carbon had to be replaced (due to fouling or excessive pulverization and consequent reduction in working capacity) during the life of the system. The extreme worst-case waste production is estimated at about 50,000 kg (55 tons) per year, which represents a minimal solid waste impact.

1.2.3 Energy and Economic Impacts of Promulgated Action

The estimated energy impacts of the proposed standards were discussed in Chapter 7 of BID, Volume I. The assumption that 25 percent of all affected terminals would install thermal oxidation systems (which recover no gasoline/energy equivalent) is considered extremely conservative, based on the updated cost estimates summarized in Tables B-1 and B-2 of Appendix B. These tables indicate that TO systems may be less cost-competitive than formerly estimated, even for the smallest terminals. Nonetheless, the previous estimated net energy savings in the fifth year of the standards has been reduced from 9 million to 7 million liters of gasoline equivalent, due mostly to the emission factor correction discussed in Section 2.4.2.

The estimated cost and economic impacts of the proposed standards were discussed in Chapter 8 of BID, Volume I. Since proposal, cost estimates have been updated in terms of first quarter 1981 dollars, and are presented in Section B.2.1 of this document. Most net annualized control costs have increased over previous estimates for all model plant sizes. This is due primarily to the effects of inflation on most cost elements, a higher assumed interest rate on borrowed capital, and the addition of continuous monitoring costs. The major compensating cost factor lowering net costs is the updated wholesale gasoline price, \$0.29 per liter instead of the previous \$0.17 per liter.

As discussed in Section B.2.2 of Appendix B, the nationwide total capital investment for the terminal industry in the first five years is estimated at \$10.8 million, or 45 percent of the estimate made previously. The net annualized cost to the terminal industry in the fifth year will be \$1.6 million, again 45 percent of the previous estimate. One reason for the decrease in the cost estimates for the terminal industry was a change in the assumption concerning the number of terminals converting previously top loading racks to bottom loading which were not linked to vapor recovery regulations. Since in these cases the top-to-bottom loading conversions are the replacements which cause application of New Source Performance Standards (NSPS), the cost of these conversions will not be attributable to the standards. After a re-evaluation of the information supplied in Section 114 letter responses, the previous estimate of 25 top-to-bottom loading conversions directly attributable to the standards was lowered to three terminals. It was estimated in these three cases that the top-to-bottom loading conversions would be performed after the facility becomes an affected facility and would be in an effort to comply with the NSPS. Another reason for the decrease was the elimination of the costs associated with add-on controls or replacement for the 10 existing vapor processing systems assumed in the previous estimates.

The for-hire tank truck industry will incur a total capital investment in the first five years of \$1.4 million. It is estimated that the total annualized cost in the fifth year will be \$0.9 million.

The economic impact analysis presented in Section B.3 updates the previous analysis contained in Section 8.4 of BID, Volume I. The general conclusions of the previous analysis are still considered valid. None of the model plant terminals will encounter a debt service coverage problem, nor will the maximum price increase necessary to maintain pre-control profit rates be excessive. The worst case would require a 0.48 percent gasoline price increase for a 380,000 liter per day (Model Plant 1) existing top loading facility. The return-on-investment (ROI) results still support the conclusion that essentially no growth in the number of 380,000 liter per day terminals will take place because both pre-control and after-control ROI's do not meet the acceptable level. The position of new terminals in the 950,000 liter per day category (Model Plant 2) has improved, such that they now remain attractive after-controls investments, even without complete cost pass-through.

1.3 REFERENCES

III-B-1[b] Bulk Gasoline Terminals - Background Information for Proposed Standards. Draft EIS. Publication No. EPA-450/3-80-038a. December 1980.

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[b] This number corresponds to the docket item number in Docket No. A-79-52.

2.0 SUMMARY OF PUBLIC COMMENTS

The list of commenters, their affiliations, and the EPA docket number assigned to each of their comments are shown in Table 2-1. (Comment letters identified in this table are not repeated in the references section of this chapter.) Forty-two letters contained comments, and six people testified at both public hearings on the proposed standards and Volume I of the the Background Information Document. The significant comments have been combined into the following 10 major areas:

1. General Issues
2. Designation of Affected Facility
3. Modification and Reconstruction
4. Environmental Impacts
5. Economic Impacts
6. Emission Control Technology
7. Selection of Emission Limit
8. Test Methods and Monitoring
9. Tank Truck Controls
10. Legal Considerations

The comments, issues, and their responses are discussed in the following sections of this chapter. A summary of the changes made to the standards since proposal is included in Section 1.1 of Chapter 1.

2.1 GENERAL ISSUES

2.1.1 Need for the Standard

Comment: Several commenters recommended that the proposed standards be cancelled and that Alternative I, no additional regulation, be adopted. Instead, the State implementation plans (SIP's) should be relied upon to control VOC emissions from bulk gasoline terminals. Also, it was argued that Stage I and Stage II controls are unfair and not cost-effective,

TABLE 2-1. LIST OF COMMENTERS ON THE PROPOSED STANDARDS OF PERFORMANCE FOR BULK GASOLINE TERMINALS

Item Number in Docket A-79-52	Commenter and Affiliation
IV-F-1	Public Hearing transcript Environmental Research Center Research Triangle Park, N.C. January 21, 1981
IV-F-2,[a] IV-D-20, IV-D-43	Mr. Lem McManness Marathon Oil Company Findlay, Ohio 45840
IV-F-3,[a] IV-D-46	Mr. B.S. DiGiovanni ARCO Petroleum Products Company 515 South Flower Street Los Angeles, California 90051
IV-F-4	Public Hearing transcript EPA/Beaunit Complex Research Triangle Park, N.C. January 28, 1981
IV-F-5, IV-D-53	Mr. Ray C. Edwards Edwards Engineering Corporation 101 Alexander Avenue Pompton Plains, New Jersey 07444
IV-F-6,[a] IV-D-44	Mr. Clifford J. Harvison National Tank Truck Carriers, Inc. 1616 P Street, N.W. Washington, D.C. 20036
IV-E-19	Post-Proposal Industry Meeting to Hear Comments on the Proposed Standard. Industry representatives were: Lem McManness, Marathon Oil Company B.S. DiGiovanni, ARCO Petroleum Products Company Byron Stoddard, Shell Oil Company C.E. Henderson, Amoco Oil Company Charles W. Dougherty, Texaco, Incorporated Edward J. Karkalik, Standard Oil Company of Ohio

TABLE 2-1. LIST OF COMMENTERS ON THE PROPOSED STANDARDS OF PERFORMANCE FOR BULK GASOLINE TERMINALS (Continued)

Item Number in Docket A-79-52	Commenter and Affiliation
IV-D-23	Mr. J.S. Trout Mr. I.D. Curran Exxon Company, USA P.O. Box 2180 Houston, Texas 77001
IV-D-24, IV-D-41	Mr. C.E. Henderson Amoco Oil Company 200 East Randolph Drive P.O. Box 6110A Chicago, Illinois 60680
IV-D-25	Mr. J.J. Moon Phillips Petroleum Company Bartlesville, Oklahoma 74004
IV-D-26	Mr. C.T. Sawyer American Petroleum Institute 2101 L Street, N.W. Washington, D.C. 20037
IV-D-27	Mr. Leonard P. Steuart, II Independent Fuel Terminal Operators Association 1700 Pennsylvania Avenue, N.W. Suite 300 Washington, D.C. 20006
IV-D-28	Mr. Michael J. Duffy Ashland Oil, Inc. P.O. Box 391 Ashland, Kentucky 41101
IV-D-29	Ms. Susan R. Kauffman Union Oil Company of California Union Oil Center, Box 7600 Los Angeles, California 90051
IV-D-30, IV-D-40	Mr. A.G. Smith Shell Oil Company One Shell Plaza P.O. Box 4320 Houston, Texas 77210
IV-D-31	Mr. R.W. Kreutzen Chevron U.S.A., Inc. P.O. Box 3069 San Francisco, California 94119

TABLE 2-1. LIST OF COMMENTERS ON THE PROPOSED STANDARDS OF PERFORMANCE FOR BULK GASOLINE TERMINALS (Concluded)

Item Number in Docket A-79-52	Commenter and Affiliation
IV-D-32	Mr. Darrell D. LaRue Diamond Shamrock Corporation P.O. Box 631 Amarillo, Texas 79173
IV-D-33	Mr. J.W. Drake Kerr-McGee Corporation Kerr-McGee Center Oklahoma City, Oklahoma 73125
IV-D-34	Mr. R.A. Nichols R.A. Nichols Engineering 519 Iris Avenue Corona Del Mar, California 92625
IV-D-35	Mr. Michael D. Graves Hall, Estill, Hardwick, et. al. 4100 Bank of Oklahoma Tower Tulsa, Oklahoma 74172
IV-D-36	Mr. James C. McGill McGill, Incorporated 5800 West 68th Street P.O. Box 9667 Tulsa, Oklahoma 74107
IV-D-37, IV-D-38, IV-D-42	Mr. E.J. Karkalik Standard Oil Company of Ohio Midland Building Cleveland, Ohio 44115
IV-D-39	Mr. James F. McAvoy State of Ohio Environmental Protection Agency Box 1049, 361 E. Broad St. Columbus, Ohio 43216
IV-D-45	Ms. Lynne R. Harris Department of Health & Human Services (NIOSH) 5600 Fishers Lane Rockville, Maryland 20857

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[a] These documents are transcripts submitted by commenters at the public hearing and are essentially identical to their oral testimonies.

TABLE 2-1. LIST OF COMMENTERS ON THE PROPOSED STANDARDS OF PERFORMANCE FOR BULK GASOLINE TERMINALS (Continued)

Item Number in Docket A-79-52	Commenter and Affiliation
IV-D-1	Mr. R.W. Bogan GATX Terminals Corporation 120 South Riverside Plaza Chicago, Illinois 60606
IV-D-3	Mr. Francis R. Perry State of California Air Resources Board 1102 Q Street P.O. Box 2815 Sacramento, California 95812
IV-D-4	Mr. Robert Denyszyn Scott Environmental Technology, Inc. Plumsteadville, Pennsylvania 18949
IV-D-5	Mr. Albert B. Rosenbaum, III National Tank Truck Carriers, Inc. 1616 P Street, N.W. Washington, D.C. 20036
IV-D-6	Mr. W.R. Riedel United States Coast Guard Department of Transportation Washington, D.C. 20593
IV-D-7	Mr. Jack M. Heinemann Federal Energy Regulatory Commission Washington, D.C. 20426
IV-D-8	Ms. Barbara J. Faulkner National Oil Jobbers Council 1707 H Street, N.W., 11th Floor Washington, D.C. 20006
IV-D-9	Mr. Charles L. Miller Texas City Refining, Inc. P.O. Box 1271 Texas City, Texas 77590
IV-D-10	Mr. A.D. Davis Transgulf Pipeline Company P.O. Box 44 Winter Park, Florida 32790

TABLE 2-1. LIST OF COMMENTERS ON THE PROPOSED STANDARDS OF PERFORMANCE FOR BULK GASOLINE TERMINALS (Continued)

Item Number in Docket A-79-52	Commenter and Affiliation
IV-D-11	Mr. William R. Deutsch Illinois Petroleum Marketers Assoc. P.O. Box 1508 112 West Cook Street Springfield, Illinois 62705
IV-D-12	Mr. Norwood K. Talbert AGWAY, Inc. P.O. Box 4933 Syracuse, New York 13221
IV-D-13	Mr. John Prokop Independent Liquid Terminals Assoc. 101 15th Street, N.W. Washington, D.C. 20005
IV-D-14	Mr. E.P. Mampe Crown Central Petroleum Corporation P.O. Box 1168 Baltimore, Maryland 21203
IV-D-16	Mr. Martin A. Smith Pacific Resources, Inc. PRI Tower, 733 Bishop Street P.O. Box 3379 Honolulu, Hawaii 96842
IV-D-17	Mr. Barnard R. McEntire Air Pollution Control District County of San Diego 9150 Chesapeake Drive San Diego, California 92123
IV-D-18	Mr. Dave Fellers Texas Oil Marketers Association 701 W. 15th Street Austin, Texas 78701
IV-D-19	Mr. Willard T. Young Texas Eastern Transmission Corporation P.O. Box 2521 Houston, Texas 77001

and the amount of pollution controlled is minimal. One commenter further questioned the need for the standards since gasoline demand is projected to remain stable or decline in the future, so that emissions from new, modified, or reconstructed sources would not be expected to present any greater environmental hazard (IV-D-18, IV-D-24, IV-D-26, IV-D-28, IV-D-41, IV-E-19, IV-F-4, IV-F-6).

Four commenters felt that the additional emission reduction achieved under Alternative IV (35 mg/liter from processor plus vapor-tight tank trucks) as opposed to Alternative II (80 mg/liter from processor plus vapor-tight tank trucks) would be insignificant. The control limit of 80 mg/liter required by many SIP's has already reduced VOC emissions by 90 percent; the proposed 35 mg/liter limit would reduce nationwide bulk terminal VOC emissions by the year 1985 by only an additional 0.0058 percent (IV-D-19, IV-D-20, IV-D-30, IV-F-1, IV-F-2). Another commenter pointed out that Alternative IV would reduce nationwide emissions by only an additional 0.9 percent over the reductions resulting from SIP's (Alternative I). Also, the reduction of 6,620 Mg/yr due to this alternative would represent only 0.04 percent of the current 15 million Mg/yr nationwide VOC emissions from all sources. Due to these small reductions, it is apparent that standards have been proposed simply because they are "technically feasible." Thus, EPA has not demonstrated, as required by Section 111, that new terminals will present a significant air pollution problem (IV-D-26).

Response: The Agency proposed these standards of performance under the authority of Section 111 of the Clean Air Act (42 U.S.C. 7411) as amended. Section 111(b)(1) requires the Administrator to establish standards of performance for categories of new, modified, or reconstructed stationary sources which in the Administrator's judgment cause or contribute significantly to air pollution which may reasonably be anticipated to endanger public health or welfare.

The Agency's listing of Petroleum Transportation and Marketing 23rd on the Priority List (I-2) required under Section 111(f) (40 CFR 60.16, 44 FR 49222, August 21, 1979) reflects the Administrator's determination that this source category contributes significantly to air pollution. Before arriving at this decision, the Administrator considered the projected rate of growth in the number of facilities in this industry, the emission rates at uncontrolled facilities, and the emissions allowed under typical SIP's. EPA used the emissions forecasts in BID, Volume I, and cited by the commenters, in analyzing these factors, and the Administrator has found no sound reason to alter the conclusions based on that analysis.

It is important to note that VOC is emitted by a wide variety of source categories. The emissions contribution from many categories with VOC emissions that appear small in comparison with the total VOC emitted by all source categories is nonetheless significant to ozone formation. This is because failure to control these sources to the level achievable by the best demonstrated technology would serve to undermine the Congressionally mandated effort to prevent further deterioration of air quality caused by additional ozone formation.

Under Section 111, EPA is required to set standards of performance for those subcategories (within listed categories) for which the Agency can identify a best demonstrated system of continuous emission reduction, considering costs ("best demonstrated technology"). As explained at proposal and elsewhere in this document, the Agency has identified as best demonstrated technology for the bulk gasoline terminal industry a combination of capture and control measures aimed at reducing VOC emissions during loading (see Section 2.10.3). For this reason, EPA is required under Section 111 to promulgate standards for the bulk terminals subcategory.

The Agency accounted for the projected demand for gasoline in the coming years in estimating the emission reduction achievable through the NSPS. Despite a leveling off or reduction in gasoline demand, the new, modified, and reconstructed sources in this subcategory will continue to be an important source of VOC emissions.

Standards of performance have other benefits in addition to achieving reductions in emissions beyond those required by a typical SIP. They establish a degree of national uniformity, which precludes situations in which some States may attract new industries as a result of having relaxed air pollution standards relative to other States. Further, standards of performance provide documentation which reduces uncertainty in case-by-case determinations of best available control technology (BACT) for facilities located in attainment areas, and lowest achievable emission rates (LAER) for facilities located in nonattainment areas. This documentation includes identification and comprehensive analysis of alternative emission control technologies, development of associated costs, an evaluation and verification of applicable emission test methods, and identification of specific emission limits achievable with alternate technologies. The costs are provided for an economic analysis that reveals the affordability of controls in an unbiased study of the economic impact of controls on an industry.

The rulemaking process that implements a performance standard assures adequate technical review and promotes participation of representatives of the industry being considered for regulation, government, and the public affected by that industry's emissions. The resultant regulation represents a balance in which government resources are applied in a well publicized national forum to reach a decision on a pollution emission level that allows for a dynamic economy and a healthful environment.

As stated above, the standards reflect application of the best demonstrated technology for new, modified, and reconstructed sources in this subcategory. While technical feasibility is a fundamental criterion for standard-setting, EPA considered additional factors, including cost, energy requirements, and other impacts, before arriving at the final standard. Based upon these factors, the Agency selected at proposal a control alternative which reflects Alternative IV. As explained in Section 2.3.1, the Agency has revised the standard in response to these and other comments; the standards are now based on a control alternative which reflects a combination of Alternatives II and IV.

Comment: One commenter indicated that the States are already using the proposed standards as a new guideline for construction permit conditions. This was said to constitute needless hardship and was given as a reason for withdrawal of the proposal (IV-E-19).

Response: Section 111 does not indicate that the existence of independent State standard-setting authority is a proper basis for foregoing or postponing establishment of Federal NSPS. States are free under Section 116 of the Act to establish more stringent emission limits than those established under Section 111 or 112, or those necessary to maintain the NAAQS under Section 110. Consequently, it is possible that new sources may in some cases be subject to limitations more stringent than standards of performance under Section 111.

Despite these considerations, all States recognize that a proposed standard of performance for new sources is not considered a final rule until it has been promulgated. Once the Administrator has considered all public comments, a proposed standard may undergo certain modifications in the time period preceding promulgation of the final performance standard. Only after the standard has been promulgated do the standards of performance become effective for all new or modified bulk gasoline terminals.

Comment: One commenter stated that, because of Prevention of Significant Deterioration (PSD) regulations which apply essentially the SIP level of control to new or modified sources in attainment areas, controls proposed under the NSPS will already be largely in place (IV-D-1). Also, existing and new sources in nonattainment areas would be adequately controlled by SIP requirements. In attainment areas, PSD requirements would deal with any shifting of emissions from one area of the country to another (IV-D-24, IV-E-19).

Response: The typical SIP including provisions for bulk gasoline terminal emissions will be guided by the two control techniques guidelines (CTG) documents (II-A-18, II-A-32) discussed on page 3-21 of BID, Volume I. The NSPS requirements, reflecting the best control systems and considering costs and other impacts, will result in additional emission reduction over the estimated SIP "baseline" level. The provisions of the PSD regulations were not included in the baseline analysis because at this time it is unclear how the PSD requirements will be interpreted in different areas. Congress demonstrated its concern about this potential variability by requiring EPA to establish nationally uniform minimum standards as a floor underlying the requirements established in the case-by-case PSD and nonattainment area new source reviews. In addition to achieving further reductions in emissions beyond those required by a typical SIP, standards of performance establish the degree of national uniformity sought by Congress for control of new, modified, and reconstructed facilities.

2.1.2 Designation of Effective Date of the Standard

Comment: One commenter requested that EPA provide its "customary leeway" between the promulgation date and the date the regulation becomes effective (IV-D-12).

Response: While the commenter did not elaborate on his reference to "customary leeway," the Administrator has not traditionally provided leeway between the promulgation date and the date the regulation becomes effective. Section 111(b)(1)(B) of the Clean Air Act states "standards of performance . . . shall become effective upon promulgation." As stated in Section 111(e) of the Act, "after the effective date on which the standard has been promulgated, it shall be unlawful for any owner or operator of a new or modified source to operate such source in violation of the standard of performance applicable to such source."

Comment: One commenter stated that the current applicability date of December 17, 1980, would cause disruption in the compliance schedules of terminals working to comply with the requirements of SIP's. A revised date of January 7, 1982, was suggested, in order to allow current efforts to be completed (IV-D-23). Another commenter felt that a phase-in period should exist between the promulgation date and the effective date of the standards, to avoid construction delays which could result from the present arrangement (IV-D-32).

Response: The Administrator believes that some doubt was introduced in the preamble to the proposed standards as to the application of the reconstruction provisions to existing facilities undergoing programs of component replacement due to State and local bulk terminal regulations. Consequently, owners and operators making plans to install control systems at these facilities may have been misled to believe that stricter NSPS requirements might not apply. For this reason, the Administrator has changed the applicability date for facilities in this situation from the date of proposal to the date of promulgation.

Under Section 60.500(c), any component replacement program commenced (as defined in Section 60.2) before the promulgation date, and determined by the Administrator to be necessitated by State or local bulk terminal regulations, will not subject a bulk terminal facility to the NSPS by means of the reconstruction provisions. However, component replacement programs commenced after the promulgation date, regardless of mandated requirements, will be considered under the reconstruction provisions of 40 CFR 60.15. A more complete discussion of this issue can be found in Section 2.3.1 of this document.

2.1.3 Definition of a Bulk Gasoline Terminal

Six commenters recommended that changes to the definition of a bulk gasoline terminal would make its meaning and applicability clearer.

Comment: Two commenters suggested that the CTG limitation of throughput greater than 20,000 gallons per day be incorporated into the definition of a bulk gasoline terminal so that bulk plants which are served by ship or barge are excluded from the standard (IV-D-26, IV-D-30). Another commenter suggested that terminals with a throughput of less than 250,000 gallons per day be exempt from the regulation, since the costs of installing vapor recovery equipment at such a facility would far outweigh the environmental benefits (IV-D-16). Another commenter recommended that the Administrator exempt as nonmajor sources, facilities that have less than 200,000 gallons per day throughput. Marginal or small operators cannot invest the additional capital necessary to install a vapor collection system, leading to the prolonged life of old, less efficient gasoline truck loading facilities (IV-D-33).

Response: To clarify the intended applicability of the NSPS, a definition of bulk terminal dependent upon a throughput cutoff has been included in §60.501. The purpose of this definition is to exclude the smaller bulk plant. With this intention, a bulk terminal has been defined to have a gasoline throughput greater than 75,700 liters per day. The gasoline throughput shall be the maximum calculated design throughput as may be limited by compliance with an enforceable condition under Federal, State, or local law. Reference to an enforceable condition allows a source to limit its maximum design throughput by limiting its hours of operation, or any other operating parameter. The only requirements are that this limitation be a part of an enforceable document and the source maintain compliance with it. This document could be issued by any government entity as long as it was discoverable by both EPA and any citizen as contemplated in Section 304 of the Clean Air Act. By obtaining such documentation, which would reflect a source's maximum expected actual throughput, ambiguities as to how one would determine throughput are eliminated. For example, a bulk plant which receives gasoline by barge, with a statement (documented in an enforceable permit) that it will not exceed a throughput of 15,140 liters/day (4,000 gal/day), could not be misconstrued as a bulk terminal.

Since proposal of these standards, the costs of installing vapor recovery equipment for smaller terminals have been re-examined in light of additional information supplied by commenters. The revised cost impact estimates are presented in Section B.2 of Appendix B. These revised cost and economic impacts do not indicate an adverse impact on even the smallest model plant (380,000 liters/day, or 100,000 gallons/day). Therefore, incorporating a throughput cutoff of 200,000 or 250,000 gallons/day is not warranted.

Comment: One commenter advised that by adding the phrase "from a refinery" to the end of the definition of a bulk gasoline terminal, certain marine bulk plants of low throughput would be excluded from the standards (IV-D-29, IV-F-1). Another commenter recommended that the definition of a bulk gasoline terminal be revised to exclude refinery facilities which receive gasoline by "pipeline" (IV-D-30).

Response: It is unnecessary to include "from a refinery" in the revised definition of a terminal. The throughput limitation, which has been added to the definition, will serve to exclude from the standards certain marine bulk plants of low throughput, which receive their gasoline by ship or barge. Also, if the phrase "from a refinery" were added, it is possible that certain terminal facilities may be inadvertently excluded from the standards, particularly any terminals which may not receive gasoline from a refinery.

Gasoline terminals at refineries load gasoline into tank trucks from loading racks. This operation is identical to operations at conventional terminals and is intended to be covered by these standards. Therefore, any new or modified bulk gasoline terminal of sufficient throughput which receives gasoline by "pipeline," regardless of location, will be affected by the standards.

Comment: One commenter stated that many terminals handling gasoline for others are not wholesale outlets, since they do not own the gasoline, whereas the proposed regulation defines bulk gasoline terminals to include only wholesale outlets (IV-D-13).

Response: It was not EPA's intent in the proposed standards to exclude typical terminals from the regulation which may not be classified as wholesale outlets. While some terminals, as the commenter points out, are not "wholesale" outlets since they do not own the gasoline, they nonetheless perform the gasoline transfer operations. The sole intent of including the term "wholesale" in the definition at proposal was to distinguish the facilities from large retail service stations which may receive gasoline by pipeline. The facility described by the commenter is clearly not a retail outlet and the intent was to cover this type of facility. With the addition of a throughput cutoff and with the retention of the mode-of-delivery definition, EPA believes that retail outlets will be excluded. Therefore, the term "wholesale" is considered unnecessary and is deleted from the definition.

2.1.4 Executive Order 12291

Comment: Three commenters stated that the proposed standards violate the Executive Order 12291 criteria for priority-setting, evidentiary support, and rational decision-making. This opinion is based generally on what they felt was EPA's failure to demonstrate an adequate and favorable cost-benefit situation (IV-D-18, IV-D-26, IV-D-31).

The commenters stated that the general requirements for Federal regulations set forth in Executive Order 12291 stress the need for an analysis of the incremental benefits to society derived from the incremental costs involved in choosing the more stringent emission limit (35 mg/liter versus 80 mg/liter). They cited Section 2 of the Order which, in part, requires the following:

> "(b) Regulatory action shall not be undertaken unless the potential benefits to society for the regulation outweigh the potential costs to society;
>
> (c) Regulatory objectives shall be chosen to maximize the net benefits to society;
>
> (d) Among alternative approaches to any given regulatory objective, the alternative involving the least net cost to society shall be chosen; and
>
> (e) Agencies shall set regulatory priorities with the aim of maximizing the aggregate net benefits to society. . ."

The commenters noted that Section 2(d) of the Order requires that EPA consider the incremental cost of selecting a 35 mg/liter limit rather than an 80 mg/liter limit in light of alternative methods of controlling VOC emissions. This latter analysis was claimed to be entirely lacking in the BID (IV-D-31).

Response: The original economic analysis in BID, Volume I revealed fifth-year net annualized costs of $6.0 million ($5.3 million for the bulk terminal industry and $0.7 for the for-hire tank trucks), which is well below the $100 million criterion (BID, Volume I, Section 8.5.1), which would classify this as a major regulation and would mandate an in-depth cost-benefit analysis. The revised economic analysis (Section B.3 of Appendix B) supports this conclusion, with the net cost to industry in the fifth year now estimated to be $2.5 million.

Nevertheless, the Agency has undertaken a comprehensive economic analysis of the regulatory alternatives. In addition, the Agency has carefully considered both the emission reduction and costs associated with each of four regulatory alternatives on both an average and an incremental basis. Among the alternatives considered were the 35 mg/liter and 80 mg/liter emission limits addressed by the commenters. As shown in Chapter 8 of BID, Volume I, the Agency considered these costs and benefits in connection with 140 combinations of facility classification, regulatory alternative, model plant size, and vapor control unit type.

The Agency has responded in Section 2.5 to specific comments on the cost analysis presented in BID, Volume I. Based on its consideration of these comments and EPA's projection of the impact of each alternative, the Agency has concluded that the alternative chosen--35 mg/liter and loading only into vapor-tight trucks--represents the regulatory alternative that would result in the greatest emission reduction achievable at reasonable cost for new vapor processing systems. Furthermore, as discussed in Section 2.3.1, affected facilities with existing vapor control systems installed under SIP programs will be required to meet an emission limit of 80 mg/liter [§60.502(c)]. In most cases, this is the limit for which such systems are being designed, and so replacement or upgrading of the system should be unnecessary under NSPS. This requirement eliminates many of the concerns expressed by the commenters about the incremental costs and emission reductions of an 80 mg/liter versus 35 mg/liter limit, because the expense of replacing or upgrading an existing vapor processor which is performing to its design level will not be incurred by most owners and operators of modified or reconstructed facilities which are already being controlled under SIP's. Thus, EPA has undertaken analyses and selected an alternative that in the Agency's judgment responds to the intent of the requirements of Executive Order 12291, to the extent permitted by law, and is permitted under the strict requirements of Section 111.

2.1.5 Other Comments

Comment: One commenter felt that, as a result of the proposed rule, the States would require all bulk plants and service stations to install a vapor recovery balance system (IV-D-11).

Response: The performance standard for bulk gasoline terminals does not limit emissions from either bulk plants or service stations by requiring the installation of vapor recovery systems at either of these types of facilities. As discussed in the preamble to the proposed regulation, the promulgated standards of performance limit TOC emissions (and hence, VOC emissions) from each affected facility on which construction, modification, or reconstruction commenced after December 17, 1980. The affected facility is the total of all the loading racks at a bulk gasoline terminal which deliver either gasoline into any delivery tank truck or some other liquid product into trucks which have loaded gasoline on the immediately previous load.

Many States require under separate regulatory action that service stations and bulk plants install balance systems to limit VOC emissions in nonattainment areas. Balance systems are used at gasoline bulk plants and service stations to limit VOC emissions by exchanging vapors for delivered product through the use of vapor piping. However, the regulatory action of this standard is totally independent of State actions.

Comment: One commenter was concerned about the proper delegation of the enforcement responsibility for the NSPS standard. This commenter recommended that the city or county where a bulk gasoline terminal is located be entrusted with the enforcement of the standard, since they may already have the responsibility for enforcing State regulations. This would relieve terminal owners/operators and the States from complying with differing regulations that possibly duplicate enforcement efforts (IV-D-32).

Response: The proper delegation of the enforcement responsibility for the NSPS standard is outlined in Section 111(c)(1) of the Clean Air Act. Once a performance standard has been promulgated, each State may develop and submit to the Administrator a procedure for implementing and enforcing standards of performance for new sources located in each State. If the Administrator determines that the State procedure is adequate, authority to implement and enforce such standards will be delegated to that particular State.

Comment: Another commenter thought that the proposal would have a substantial impact on many small businessmen and should thus be revised to conform to the intent of the Regulatory Flexibility Act (IV-D-5).

Response: The Regulatory Flexibility Act (RFA) does not by its terms apply to regulations proposed prior to January 1, 1981. Consequently, the Act does not impose any requirements in the Agency's development of the bulk gasoline terminal NSPS. With regard to totally new bulk terminals, it is projected that even in the absence of additional regulation there will be little growth among smaller terminals. However, most of the existing terminals which become affected due to modification or reconstruction are likely to be of the smaller sizes. Therefore, the Agency has considered the economic impact of the standards on relatively small terminals and carriers, and the economic analysis has since been reviewed in reference to the RFA with the results presented in Appendix B.5. The criteria necessitating a full-scale regulatory flexibility analysis were reviewed for the small business sector of this industry. Because of the unlikelihood of significant differential impacts on either the large or small terminal and tank truck business sectors resulting from these standards, the in-depth Regulatory Flexibility Analysis was not indicated to be necessary.

2.2 DESIGNATION OF AFFECTED FACILITY

Comment: One commenter stated that the purpose of NSPS is violated by designating the affected facility to include more than just the specific new or modified facility. He pointed out that the benefits to air quality would probably occur anyway, due to the technology involved (IV-D-1).

Response: In choosing the affected facility, the Agency decides which piece or group of equipment is the appropriate unit for separate emission standards in the particular industrial context involved. The Agency does this by examining the situation in light of the terms and purpose of Section 111 of the Clean Air Act. The purpose of Section 111 is to minimize emissions by application of the best demonstrated control technology at all new and modified sources (considering cost, other health and environmental effects, and energy requirements). In some cases a narrower designation of the affected facility may be appropriate, because it ensures that new emission sources within plants will be brought under the coverage of the standards as they are installed. However, if the Agency concludes that a broader designation would result in greater emission reduction, and that consideration of the other relevant statutory factors (technical feasibility, cost, energy, and other environmental impacts) reveals that choosing a broader designation would be reasonable, then the Agency may choose the broader designation.

While selection of a narrower designation of affected facility results in greater emission reduction by earlier coverage of replacement equipment, it appears a broader designation would result in greater emission reduction in the bulk gasoline terminal industry. EPA projects that if loading rack replacements do occur, they will involve major changes in the rack system (such as conversion from top to bottom loading) and will involve most or all of the racks at the terminal rather than just one rack. Through modification and reconstruction, the broader designation of the affected facility will result in the application of the standards to more loading racks and therefore will result in greater emission reduction.

The Agency requested comments specifically concerning this issue at proposal, to verify whether the environmental and economic impacts of alternative affected facility designations, as projected by the Agency, are accurate. The Agency also requested specific information and data which would permit an evaluation of these impacts. This has been the only written comment to specifically address this issue which was received by the Agency during the public comment period. Comments were also received from six industry representatives who stated at a meeting with EPA that they had no objection to the proposed designation of the affected facility (IV-E-19). Since the conclusions about emission reductions and costs have not changed for this facility designation, EPA has retained the total racks designation of the affected facility.

2.3 MODIFICATION AND RECONSTRUCTION

2.3.1 SIP Conversions

Comment: Several commenters were concerned that conversions now being made to terminals to satisfy SIP control requirements, such as top-to-bottom loading conversions and installation of vapor control equipment, could subject these terminals to more stringent NSPS requirements. It was suggested by some of the commenters that the economic impact on the industry would be great and that these conversions should be exempted from the reconstruction provisions of 40 CFR 60.15 (IV-D-14, IV-D-25, IV-D-26, IV-D-28, IV-F-1, IV-F-2).

Response: The section entitled "Impacts of Regulatory Alternatives" in the preamble to the proposed standards discussed the environmental, cost, and economic impacts on bulk terminal facilities complying with the requirements of those standards. Included in the discussion were impacts on new, modified, and reconstructed facilities. The impacts estimated for the standards did not include any reconstructions resulting from application of State or local air pollution requirements. However, as several commenters pointed out, a large number of terminal facilities that the Agency did not project as affected could indeed become subject to the standards in the process of complying with such requirements. Thus, the preamble discussion suggested that existing facilities commencing component replacement in response to State or local requirements would not be subject to 40 CFR 60.15.

The Agency believes that this suggestion introduced some doubt as to the otherwise straightforward application of the reconstruction provisions to existing facilities undergoing such changes. Consequently, owners and operators making plans to install control systems at these facilities may have been misled to believe that stricter NSPS requirements might not apply, and may therefore not have considered the stricter NSPS requirements when designing their systems.

For this reason, the Administrator has determined that any facility that has commenced substantial component replacement in response to state or local emission standards after the applicability date (the proposal date--December 17, 1980) but prior to the date of promulgation will not be subject to these requirements by operation of the reconstruction provisions of 40 CFR 60.15. Under Section 60.500(c), any component replacement program commenced (as defined in Section 60.2) before the promulgation date, and determined by the Administrator to be necessitated by State or local bulk terminal regulations, will not subject a bulk terminal facility to the NSPS by means of the reconstruction provisions.

It should be noted, however, that 40 CFR 60.15 applies by straightforward application to any existing facility undergoing component replacement. Neither the language nor the purposes of that provision and the definition of "new source" in Section 111 supports exemptions based on the owner's intent in performing construction on the facility.

Because this preamble corrects the misimpression that Section 60.15 does not apply to facilities undergoing SIP component replacement, the Agency is applying that provision to SIP component replacement programs commenced after the promulgation date. Of course, owners or operators performing reconstruction for other purposes, or modifications or new construction for any purpose, are still governed by the applicability date of December 17, 1980, contained in Section 60.500(b).

Comment: Several commenters stated that the number of facilities affected by the modification and reconstruction provisions was greatly underestimated by EPA. EPA had estimated that 110 terminals would be subject to the proposed regulation within the next 10 years: 10 new terminals and 100 modified or reconstructed terminals. This estimate was claimed to be inaccurate since 30 States will require at least some terminals within their jurisdictions to control TOC emissions to 80 mg/liter. Control of TOC emissions to 80 mg/liter will require top-to-bottom loading conversions and vapor recovery installation. These operational changes will usually constitute a "reconstruction" of the terminal, thereby subjecting the terminal to EPA's proposed regulation (IV-D-23, IV-D-26, IV-D-35, IV-D-37, IV-E-19, IV-F-1, IV-F-3).

One commenter estimated that from 250 to 800 reconstructions could be performed in the next 10 years, and stated that EPA's inclusion of so many existing sources because of SIP conversions was an invasion of the State and local sphere of regulation and thus beyond EPA's statutory authority (IV-D-26). Another commenter stated that as many as 25 percent of his company's existing terminals could be impacted in the next 10 years (IV-F-1, IV-F-3).

Response: As stated in the previous response, §60.500(c, changes the applicability date from the proposal date to the promulgation date for gasoline loading rack component replacement programs that were commenced prior to the promulgation date for the purposes of meeting State or local regulations. Since most State or local regulation-related component replacement programs at terminals will have commenced by the promulgation date, the change in the applicability date, in effect, excludes these terminals from the standards. The commenters included these State or local regulation-related changes in their determinations; therefore, the number of affected facilities estimated by the commenters is much too high. EPA considers its estimate of 110 new, modified, or reconstructed terminals still to be accurate. As stated in Section 8.1.2 of BID, Volume I, the estimate of 10 new facilities and 100 modified or reconstructed facilities was based primarily on information obtained from oil companies through responses to Section 114 letter requests (II-D-118, II-D-121, II-D-122, II-D-124, II-D-125, II-D-127-138). This was supplemented by telephone conversations with several control agencies, oil companies, and terminal construction engineering firms (II-E-34-38, II-E-41-44, II-E-46-49, II-E-51, II-E-79, II-E-93).

Comment: One commenter felt that if the proposed standards further limited allowable VOC emissions from 80 mg/liter to 35 mg/liter of gasoline loaded, then 30 of his 59 plants would experience "immediate operational constraints," since they are equipped with vapor processing units of the compression-refrigeration-absorption (CRA) or lean oil absorption (LOA) type, which EPA data indicate cannot meet the 35 mg/liter limit (IV-D-30).

Response: The existing facilities described by the commenter would not be subject to the standards unless modification or reconstruction "commenced" after the proposal date of December 17, 1980. Any such work commenced prior to the proposal date would not apply under these standards. However, programs of construction, modification, or reconstruction would subject a terminal owner or operator to the requirements of the standards, as stated in §60.500(b) of the regulation. Further, §60.502(c) of the proposed regulation established an emission limit of 35 mg/liter to be applied to all such facilities. Included in this group of facilities were those which had previously installed vapor collection and processing systems under SIP requirements, such as those referred to by the commenter. EPA estimates that 20 such facilities will become affected by NSPS through modification or reconstruction in the first 5 years in which the standards are in effect. Of these 20 facilities, 10 are likely to have vapor control systems which already meet a 35 mg/liter limit (CA, TO, and some REF systems). The remaining 10 systems should be attaining the 80 mg/liter limit required under most State plans.

One paragraph about facilities with existing vapor processing equipment was added to Section 60.502. The Agency has concluded that it is quite costly in light of the resulting emission reduction for an owner whose existing facility becomes subject to NSPS (e.g., through modification or reconstruction) to meet 35 mg/liter when the facility already has a system capable of meeting 80 mg/liter, but not 35 mg/liter. In the Administrator's judgment, however, it is unreasonably costly to require such a facility to install the add-on technology that will achieve 35 mg/liter only if the facility began constructing or substantially rebuilding (i.e., "refurbishing") the control system before receiving notice December 17, 1980, that BDT for those facilities, were they later to come under NSPS, would likely be equipment capable of meeting 35 mg/liter.

By contrast, EPA considers it reasonable to apply the 35 mg/liter limit to a facility whose owner commenced construction or refurbishment of a control system not capable of meeting 35 mg/liter despite having received this notice. It is reasonable to expect such an owner to avoid the high cost of going from 80 mg/liter to 35 mg/liter simply by constructing or refurbishing the facility's control system with technology that would meet EPA's 35 mg/liter limit and make later retrofit unnecessary. This is reasonable to require even of facilities with existing control systems constructed or refurbished after December 17, 1980, for the purpose of meeting an 80 mg/liter State limit.

For these reasons, EPA has added Section 60.502(c), which permits affected facilities with such vapor control equipment to meet 80 mg/liter if construction or substantial rebuilding (i.e., "refurbishment") of that equipment commenced before the proposal date, December 17, 1980. This is based on the Administrator's judgment that BDT for these facilities is no further control, while BDT for facilities with vapor processing systems on which construction or refurbishment commenced after proposal is the replacement or add-on technology that would enable the facility to achieve 35 mg/liter.

Definitions for "existing vapor processing system" and "refurbishment" were added to the regulation to indicate that if in any 2-year period following the date the facility becomes an affected facility the fixed capital cost of improvements or changes to an existing vapor processing system exceeds 50 percent of the cost of a comparable entirely new vapor processing system, the altered vapor processing system must then meet the 35 mg/liter limit. Consequently, refurbishment applies only to those systems which become extensively altered over this period.

2.3.2 Interpretation of Reconstruction

Comment: One commenter felt that the reconstruction provisions are contrary to law, because the provisions apply to converted facilities from which emissions have not increased. An example of the potential misapplication of these provisions was provided: conversion from top to bottom loading, in which emissions would be expected to decrease. The consideration of this situation under reconstruction was said to be contrary to the legislative intent of Section 111. Further, the commenter suggested that the reconstruction provisions be deleted from this and all other NSPS. If this is not done, a thorough legal analysis in support of EPA's authority to regulate reconstructed sources under 40 CFR 60.15 should be published, as required by Executive Order 12291, Section 4(a) (IV-D-31).

Response: Since in enacting Section 111 Congress did not define the term "construction," the question arose whether NSPS would apply to facilities being rebuilt. Noncoverage of such facilities would have produced the incongruity that NSPS would apply to completely new facilities, but not to facilities that were essentially new because they had undergone reconstruction of much of their component equipment. This would have undermined Congress's intent under Section 111 to require strict control of emissions as the Nation's industrial base is replaced.

EPA promulgated the reconstruction provisions in 1975, after notice and opportunity for public comment (40 FR 58420, December 16, 1975), to fulfill this intent of Congress. Since this turnover in the industrial base may occur independently of whether emissions from the rebuilt sources have increased, the reconstruction provisions do not focus on whether the changes that render a source essentially new also result in increased emissions.

Congress did not attempt to overrule EPA's previous promulgation of Section 60.15 in passing the Clean Air Act Amendments of 1977. This indicates that Congress viewed the reconstruction provisions' focus on component replacement, rather than emissions level, as consistent with Section 111. See, e.g., Red Lion Broadcasting Co. v. FCC, 395 U.S. 367 (1969); NLRB v. Bell Aerospace Division, 416 U.S. 267 (1974). Nor has any Court questioned the Agency's authority to subject reconstructed sources to new source performance standards. In fact, in ASARCo v. EPA, 578 F. 2d 319, 328 n.31 (D.C. Cir. 1978), the D.C. Circuit suggested that the reconstruction provisions may not go far enough toward preventing possible abuses by owners seeking to avoid NSPS by perpetuating the useful lives of their existing facilities indefinitely.

Finally, coverage under §60.15 of loading rack conversions comports well with the intent underlying Section 111. Conversion from top to bottom loading may involve replacement of much existing equipment with new equipment. In such cases, the conversion may transform the existing set of racks into an essentially new set of racks. A key goal of Section 111 is to enhance air quality over the long term and maximize the potential for long-term growth by minimizing emissions through application of the best demonstrated technology to new emission sources, concurrent with the turnover of the Nation's industrial base. If owners are permitted to replace most of the equipment in their existing sets of racks without applying the best demonstrated technology, they will be installing new equipment without minimizing emissions and maximizing the potential for long-term industrial growth, as Congress sought in enacting Section 111. For this reason, NSPS coverage of sets of racks that undergo substantial component replacement through conversion accords with Section 111, even where some decrease in emissions results from the conversion.

As discussed in Section 2.3.1, facilities undergoing reconstruction which have an existing vapor control system will be required to meet the 80 mg/liter limit under which they were previously operating. In addition to this requirement, the other provisions of §60.502 will apply, including the physical requirements on the vapor collection system which may not apply under many State regulations. Also, the tank truck vapor tightness requirements will apply to these facilities.

Comment: Commenters stated that the reconstruction provisions should apply only to projects in nonattainment areas or areas where there is a risk of significant deterioration (IV-D-23, IV-D-30).

Response: In enacting Section 111, Congress sought to require the best demonstrated level of control at all new sources, irrespective of the air quality at the location of the site. Only by assuring a minimum level of control at new sources in all areas would two key purposes underlying Section 111 be advanced -- enhancing air quality in all areas by requiring application of the best technology as the Nation's industrial base is replaced, and preventing States from relaxing environmental standards below the best demonstrated level of control to attract industry.

Comment: Several commenters stated that the interpretation of "reconstruction" in the background information document (BID, Volume I) and preamble is an unwarranted extension of EPA's past procedure in defining this provision and is not consistent with the intent of the Clean Air Act. Reconstruction, as defined in Section 60.15(d), may apply only to a project which in total meets the 50 percent capital cost level and not to an accumulation of expenditures which occurs over an unlimited time period. Under the present interpretation of reconstruction every existing loading rack, including those in attainment areas, would, through ordinary maintenance and replacement of components, become a new source long before the end of its useful life. The commenters said that bulk gasoline terminals were subject to constantly changing market conditions, resulting in the need for constant equipment upgrading in order to remain competitive and provide new services using state-of-the art loading equipment. The use of cumulative costs would be a tremendous administrative burden on the industry and EPA, and could have a negative effect on emission reductions by discouraging replacement of worn-out or defective components of certain loading facilities, even where such work would bring about reduced emissions. In particular, costly and overly burdensome recordkeeping and accounting procedures would be necessary to determine when the 50 percent total replacement cost level had been exceeded, the cost of which was not addressed in BID, Volume I (IV-D-20, IV-D-23, IV-D-24, IV-D-25, IV-D-26, IV-D-30, IV-D-31, IV-D-37, IV-D-41, IV-E-19).

Response: As stated above, EPA promulgated the reconstruction provisions because failure to require best control at sources that have become essentially new through extensive component replacement would have undermined Congress's intent that best technology be applied as the Nation's industrial base is replaced. Failure to cover facilities that have undergone extensive component replacement over a long period of time similarly postpones the enhancement of air quality Congress sought under Section 111. The D.C. Circuit recognized this when it expressed concern in the ASARCo case that, absent a provision for aggregating replacement expenditures "over the years," owners could evade the reconstruction provisions by continually replacing obsolete or worn-out equipment. 578 F.2d 319, 328 n.31 (D.C. Cir. 1978).

Section 60.15 currently defines "reconstruction" as the replacement of components of an existing facility to such an extent that "the fixed capital cost of the new components" exceeds 50 percent of the "fixed capital cost" that would be required to construct a comparable entirely new facility and EPA determines that it is technologically and economically feasible to meet the applicable NSPS. Subsection (d) indicates that the "new components" whose cost would be counted toward the 50 percent threshold include those components the owner "proposes to replace." It is unclear under this wording whether a reconstruction has occurred in the case of an owner who first seeks to replace components of an existing facility at a cost equal to 30 percent of the cost of an entirely new facility and then, shortly after commencing or completing those replacements, seeks to replace an additional 30 percent. Specifically, it is uncertain whether the owner should be deemed to have made two distinct "proposals," or instead a single proposal.

For example, assume that a terminal owner converts one of three top loading positions to bottom loading, and six months later converts another loading rack to bottom loading. If the two conversions were interpreted as separate "proposals" under Section 60.15, neither would likely exceed the 50 percent replacement cost threshold. Under this general interpretation, owners could avoid NSPS coverage under Section 60.15 simply by characterizing their replacement projects as distinct "proposals," even where the component replacement is completed within a relatively short period of time.

EPA did not intend, in promulgating the reconstruction provisions, that the term "propose" exclude from NSPS coverage facilities undergoing this type of extensive component replacement. Failure to cover these sources serves to undermine Congress's intent that air quality be enhanced over the long term by applying best demonstrated technology with the turnover in the Nation's industrial base.

To eliminate the ambiguity in the current wording of Section 60.15 and further the intent underlying Section 111 (as described above), the Agency is clarifying the meaning of "proposed" component replacements in Section 60.15. Specifically, the Agency is interpreting "proposed" replacement components under Section 60.15 to include components which are replaced pursuant to all continuous programs of component replacement which commence (but are not necessarily completed) within the period of time determined by the Agency to be appropriate for the individual NSPS involved. The Agency is selecting a 2-year period as the appropriate period for purposes of the bulk gasoline terminal NSPS (Section 60.506(b)). Thus, the Agency will count toward the 50 percent reconstruction threshold the "fixed capital cost" of all depreciable components (except those described above) replaced pursuant to all continuous programs of reconstruction which commence within any 2-year period following proposal of these standards. In the Administrator's judgment, the 2-year period provides a reasonable, objective method of determining whether an owner of bulk gasoline terminal facilities is actually "proposing" extensive component replacement, within the Agency's original intent in promulgating Section 60.15.

EPA realizes that the bulk gasoline terminal industry is constantly changing; however, the Agency believes that this 2-year limit will assure that the owner would have to make a substantial change to the facility to reach the 50 percent threshold.

The administrative effort to keep the required records should not be a burden on the industry. The recordkeeping required under a cumulative basis interpretation of reconstruction is the same as the recordkeeping that would be required under a strictly project-by-project basis interpretation. In either case, the dollar amount of the component replacement taking place at the affected facility must be determined and recorded. Once this dollar amount has been determined for each change or conversion, the additional requirement of keeping this information on file at the terminal does not appear to be an excessive burden.

Section 60.15 defines the "fixed capital cost" of replacement components as the capital needed to provide all "depreciable" components. By excluding nondepreciable components from consideration in calculating component replacement costs, this definition excludes many components that are replaced frequently to keep the plant in proper working order. There may, however, be some depreciable components that are replaced frequently for similar purposes. In the Agency's judgment, maintaining records of the repair or replacement of these items may constitute an unnecessary burden. Moreover, the Agency does not consider the replacement of these items an element of the turnover in the life of the facility concerning Congress when it enacted Section 111. Therefore, in accordance with 40 CFR 60.15(g), these standards (Section 60.506) exempt certain frequently replaced components, whether depreciable or nondepreciable, from consideration in applying the reconstruction provisions to bulk gasoline terminal facilities. The costs of these components will not be considered in calculating either the "fixed capital cost of the new components" or the "fixed capital cost that would be required to construct a comparable entirely new facility" under Section 60.15. In the Agency's judgment, these items are pump seals, loading arm gaskets and swivels, coupler gaskets, overfill sensors, vapor hoses, and grounding cables.

Comment: One commenter requested a clarification of the third review criterion used in determining a reconstruction, which is stated in the preamble to the proposed regulation: "(3) The extent to which the components being replaced cause or contribute to the emissions from the facility." This commenter felt that the term "reconstruction" should apply only if a conversion results in an increase in emissions (IV-D-29).

Response: An existing facility undergoes a "reconstruction," under 40 CFR 60.15, when (1) the fixed capital cost of its new components exceeds 50 percent of the fixed capital cost required to construct a comparable entirely new facility, and (2) it is technologically and economically feasible to meet the applicable standards. According to §60.15(a), the determination of reconstruction is made irrespective of any change in the emission rate occasioned by the component replacement.

This is because applying NSPS to sources which have undergone extensive component replacement fulfills Congress's intent to enhance air quality by requiring best demonstrated control as the Nation's industrial base is replaced.

The review criteria in Section 60.15(f) guide the Administrator's determination of technological and economic feasibility. The third criterion, the extent to which the components "cause or contribute to the emissions from the facility", relates to the replaced components' role in the facility, not the emission change caused by the replacement. This criterion provides the Administrator discretion to exclude from the reconstruction calculation replacement of components not considered to play an important role in producing emissions. However, this is only one of the factors guiding the determination. Thus, regardless of the outcome of this examination, the Administrator retains discretion under the other criteria to find that compliance by an extensively rebuilt facility is technologically and economically feasible. The Administrator's decision under Section 60.15(f) is not affected by whether any actual change in emission rate has occurred.

Comment: Another commenter was not clear as to whether the definition of a reconstruction would affect all bulk stations, terminals, and/or service stations (IV-D-11).

Response: The standards for bulk gasoline terminals, and the reconstruction provisions associated with the standards, apply only to bulk terminals which commence construction, reconstruction, or modification after the proposal date of December 17, 1980. No requirements or controls are imposed on bulk stations or service stations by these standards (see Section 2.1.5).

2.3.3 Interpretation of Modification

Comment: Five commenters felt that the interpretation of "modification" in the preamble and BID, Volume I, is overly broad because it may include altered facilities from which the overall emissions have not increased. A clarification should be made so that replacement of needed components that improve loading efficiencies would not be considered "modifications" unless they resulted in an increase in the average daily emissions. For example, the replacement of worn-out pumps with new higher capacity pumps would allow faster loading, increasing the emissions per tank truckload on a kg/hour basis during peak periods, but not on a mg/liter basis, which is the measurement of the standard. In fact, the number of tank trucks loaded during a day would not necessarily increase due to a faster loading rate.

The present interpretation of a "modification" would penalize industry for undertaking cost-saving expansions in terminal throughput capacity without increasing total VOC emission rates. It is believed that this mandate is beyond the statutory authority of EPA and is an impermissible attempt by EPA to apply the proposed standards to additional facilities (IV-D-23, IV-D-24, IV-D-26, IV-D-31, IV-D-32, IV-D-41).

Response: Section 60.14(e)(2) was purposely included in the General Provisions to exclude from consideration under the modification provisions increases in emissions due to relatively small changes. If a change increases production capacity and yet does not result in a "capital expenditure" as defined in the definitions in the General Provisions, the change would not be considered a modification.

2.4 ENVIRONMENTAL IMPACTS

2.4.1 Calculation of Emission Reductions

Comment: One commenter claimed that the analysis of emission reductions in nonattainment areas assumed that the benefits would represent the difference between a 35 mg/liter level of control and a current uncontrolled emissions situation. Actually, most terminals in those areas are being or will be controlled to 80 mg/liter or better by SIP regulations. Thus, presented estimates of VOC reductions are inaccurate (IV-D-13).

Response: The assumption used in analyzing potential emission reductions in areas which had not attained the National Ambient Air Quality Standards (NAAQS) for ozone is stated on pages 7-1 and 7-3 of BID, Volume I:

> "The category of terminals in the nonattainment areas includes new, modified, and reconstructed terminals. The air pollution impact of the regulatory alternatives on these terminals is the least because they will already be controlled by State air pollution regulations (see Section 3.3, Baseline Emissions)."

As pointed out in Section 3.3.3, Calculation of Baseline Emission Level, an assumption of emissions equivalent to 80 mg/liter from vapor processors, plus 10 percent leakage (96 mg/liter) from tank trucks, was used to calculate emission reductions in nonattainment areas.

2.4.2 Emission Factors

Several comments were received concerning the emission factors used in the emissions calculations.

Comment: One commenter claimed that it is incorrect to use the emission factor of 960 mg/liter for all calculations of emissions in attainment areas. Use of this emission factor is premised on the incorrect assumption that all deliveries in attainment areas are to facilities with vapor balance systems. In most instances the normal service, submerged fill emission factor of 600 mg/liter, is the proper factor for calculating emissions in attainment areas. Page 8-46 and Tables 8-17, 8-25, and 8-26 of BID, Volume I were cited as illustrations of inappropriate applications of these emission factors. This commenter felt that environmental benefits of the proposed standards, including the estimated quantity of VOC controlled during loading, are overstated when the emission factor used is higher than warranted. EPA's calculations predict a greater benefit to the environment by the imposition of the proposed standards than would actually occur. In addition, the cost-benefit analysis was said to be inaccurate since the environmental benefit per dollar spent is also overstated (IV-D-31).

Another commenter felt that the current emission levels had been overstated. Trucks returning from service stations without vapor balance carry vapors which average only about 20 percent of maximum saturation levels. Since there is no requirement for Stage I vapor controls, the amount of vapor recoverable is quite small, and the correct emission factor for uncontrolled trucks is 336 mg/liter, instead of 600 mg/liter. This commenter also stated that there is no splash fill loading being practiced, except for that accompanying top loading with vapor recovery. The saturation is claimed to reach 115 percent in summer, instead of the 150 percent which the emission factor of 1,440 mg/liter represents (IV-D-34).

Another commenter stated that the emission factor assumed for bottom loading in balance service should have been 850 mg/liter, instead of 960 mg/liter. As a result, this commenter feels that the assumed emission levels are unrealistically high, distorting emission inventories, efficiencies, and cost/benefit ratios (IV-D-23). A second commenter suggested that, based on performance test data, the correct factor for this type of service is 1,080 mg/liter (IV-D-3).

Response: These comments address two specific topics: the application of emission factors in attainment areas, and the accuracy of the factors which were used to calculate emissions.

EPA agrees that the emission factor which should have been applied in the case of attainment areas is the factor for normal submerged loading, 600 mg/liter, instead of the balance service factor of 960 mg/liter. A lowering of this factor from 960 mg/liter to 600 mg/liter reduces the quantities of recovered gasoline shown in the cited tables. However, the values which were given in Tables 8-17, 8-25, and 8-26 are appropriate for areas where the full SIP level of control is in effect; i.e., all nonattainment areas and some attainment areas. The primary impact of the reconsideration of this emission factor is on the estimated control costs for the model plants in attainment areas, because reducing the quantity of recovered gasoline reduces the recovery cost credits in the calculation of net annualized costs. The total volume of gasoline recovered was overstated by 60 percent; however, in re-evaluating the wholesale unit cost of the recovered gasoline, it was determined that the cost was understated by 65 percent. The net result was a slight increase in the cost credit for recovered product. These revised cost impacts are discussed in Section B.2.1 of Appendix B. The calculated emission reductions under the regulatory alternatives presented in Tables 7-1 and 7-2 of BID, Volume I are also affected by the reconsidered emission factor. Estimated nationwide emission reductions under Alternative IV have decreased by 9.4 percent from baseline levels, from a 6,620 Mg/yr reduction to a 6,000 Mg/yr reduction in the fifth year. Tables 2-2 and 2-3 in this document present the revised emission reduction figures for the regulatory alternatives. Energy impacts are also affected by this change, as well as by the revised control system electrical consumption data.

Table 2-2. VOC EMISSION REDUCTIONS AT MODEL PLANTS UNDER THE REGULATORY ALTERNATIVES (Mg/yr)

		Alternative II		Alternative III		Alternative IV	
Model Plant (liters/day)	Baseline Emissions	Emissions	VOC Reduction[a]	Emissions	VOC Reduction[a]	Emissions	VOC Reduction[a]
SIP-Controlled Area							
380,000	23	23	0	17	6	17	6
950,000	57	57	0	42	15	42	15
1,900,000	114	114	0	85	29	85	29
3,800,000	227	227	0	169	58	169	58
No SIP Control-Submerged Fill							
380,000	78	18	60	28	50	12	66
950,000	194	45	149	69	125	31	163
1,900,000	388	90	298	139	249	61	327
3,800,000	775	180	595	278	497	123	652
No SIP Control-Splash Fill							
380,000	186	18	168	28	158	12	174
950,000	465	45	420	69	396	31	434
1,900,000	930	90	840	139	791	61	869
3,800,000	1,860	180	1,680	278	1,582	123	1,737

[a] VOC Reduction = Emissions reduction from baseline emissions.

Table 2-3. NATIONWIDE AIR QUALITY IMPACTS OF REGULATORY ALTERNATIVES ON BULK TERMINAL INDUSTRY

	VOC Emissions, Mg/Yr									
			1986 Alternatives				1991 Alternatives			
	1980 Emissions	1982 Baseline Emissions	II	III	IV	Promulgated[a] Standard	II	III	IV	Promulgated[a] Standard
Total emissions from bulk gasoline terminals	341,900	140,000	134,900	135,200	134,000	134,300	129,800	130,400	128,000	128,600
Emission reductions from baseline emissions			5,100	4,800	6,000	5,700	10,200	9,600	12,000	11,400
Percent reduction from baseline emissions			3.6	3.4	4.3	4.1	7.3	6.9	8.6	8.1
Percent Reduction for new, modified, and reconstructed terminals			62	58	73	68	62	58	73	68

[a] Promulgated standard is a combination of Alternatives II (for existing vapor processing systems) and IV (for new vapor processing systems).

The estimated nationwide net energy savings in the fifth year has been reduced from 9 million to 7 million liters (56,600 to 47,200 barrels) of gasoline equivalent.

All of the emission factors used to estimate current and future emission levels were those contained in AP-42, Compilation of Air Pollutant Emission Factors (II-A-9). This document reports the most current available data which has been considered by the Agency in establishing emission factors for use in estimating emissions. Data from the EPA bulk terminal tests have been analyzed to allow a comparison with the AP-42 emission factors. In 118 loadings of tank trucks in balance service, and 123 loadings in normal service, the current emission factors of 960 mg/liter and 600 mg/liter, respectively, were corroborated (IV-J-17).

Contacts with State agencies and industry have indicated that a small amount of splash loading of gasoline is still practiced in some attainment areas, but it is generally confined to the smaller oil companies (II-E-68, II-E-69, II-E-126, II-E-127). The estimate of 10 percent splash loading in areas with no bulk terminal vapor recovery regulations is considered reasonable. The emission factor of 1,440 mg/liter for splash loading is given in AP-42. Insufficient data from terminal tests are currently available to determine whether a revision should be considered for the splash loading emission factor. However, the 150 percent saturation factor for top splash loading is based on tests of 38 tank loadings performed at various times of the year in several geographical locations (IV-J-15). The difference between the saturation factor used to derive the AP-42 emission factor and the saturation factor claimed by the commenter may result from liquid droplet or mist carryover in these test runs.

The fact that two commenters suggested changes, one upward and one downward, to the emission factor for balance service loading indicates that there may be considerable variation in the vapor concentrations emitted during this type of loading. In EPA tests, emissions from 118 individual tank trucks in this service ranged from 37 mg/liter to 4,400 mg/liter, averaging 930 mg/liter. Of these loadings, 50 percent were less than 850 mg/liter and 27 percent were more than 1,080 mg/liter. Many of the trucks in these terminal tests had serious vapor leaks, which may have caused some emissions to be lower than expected. Generally, the higher values were associated with higher ambient temperatures. Data supplied by the commenter suggesting 1,080 mg/liter were for bulk drops to underground tanks in southern California, where tank temperatures averaged about 83 degrees F (IV-J-6, IV-E-11). In light of this information, the current emission factors in AP-42 are considered at this time to represent a reasonable national average.

2.4.3 Calculated Emission Reductions

Comment: One commenter stated that the actual average performance of the control systems in EPA tests was better than the level assumed for nonattainment area baseline emission calculations. Because of this, the calculated emission reduction is erroneous, with Alternative I achieving emissions of about 85 percent of that projected for Alternative II or IV (IV-D-1).

Response: It is not practical to determine precisely the average emission level from all of the vapor processors operating under a particular regulatory emission limit. For the purpose of calculating potential emission reductions in a particular area, it is assumed that the emission limit represents the average actual emissions, since vapor processors could emit up to this amount and still meet applicable standards. For this reason, the emission limit of the alternative is used for calculating impacts.

2.4.4 Emission Impact in Clean Areas

Comment: One commenter argued that controlling terminals in the States where no control regulations are required would not appreciably improve the already clean air which is present at the source and downstream, since these terminals are located in remote, low-density population areas. The controls would raise distribution costs: first, to pay for the installation and capital recovery of equipment in small terminals, and second, to pay for the higher downtime and maintenance costs associated with maintaining equipment in areas remote from service repair facilities (IV-D-34).

Response: Section 111 requires EPA to promulgate uniform new source performance standards for subcategories of new sources, where-ever located, within source categories that the Administrator has determined are "significant contributors." Under Section 111, these standards must require control equivalent to that achievable by the best systems of emission reduction ("best demonstrated technology"). Congress believed that this would serve to prevent new pollution problems and assure that air quality is enhanced over the long term. Technology-based standards under Section 111 thus complement, rather than conform to, the air quality-based requirements of other sections of the Clean Air Act.

As discussed in Section 2.1.1, EPA has determined that emissions from the petroleum transportation and marketing industry contribute significantly to air pollution that may reasonably be anticipated to endanger public health or welfare. Accordingly, under Section 111 the Agency is required to set nationally uniform minimum standards for all industry subcategories within this category for which the Agency can identify best demonstrated technology, including bulk gasoline terminals.

It should further be noted that emissions from a 950,000 liter/day submerged loading terminal would be reduced under the standard from approximately 194 Mg/year to 31 Mg/year, or 84 percent, in an area without SIP control requirements. In the Agency's view, foregoing this level of reduction would permit the type of new pollution problems Congress sought to prevent.

The promulgated standards will increase costs to most of the affected bulk terminals, as indicated by the revised cost analysis summarized in Tables B-1 through B-3 of Appendix B. The larger facilities should be able to realize a net cost savings due to the greater product recovery when using vapor recovery equipment. While some terminals in "remote" areas may experience higher costs than other terminals, the magnitude of this cost difference is not likely to be great enough to seriously affect the ability of such terminals to comply with the standards. For example, if maintenance costs at a small terminal doubled, the net annualized cost of control would increase by only about 11 percent (Table B-1). If the terminal formerly used top loading and was converted to bottom loading as a result of the standards, this percentage increase would be reduced to about 4 percent (Table B-2). The costs of control to these example terminals would remain reasonable.

However, small, remote terminals would not be profitable even in pre-control circumstances unless maintenance and repair services were available at a reasonable cost.

Section 2.5 and Appendix B discuss the updated costs as well as the economic impacts of the standards on small terminals.

2.4.5 Impact of Tank Truck Testing

Comment: One commenter thought that the effluent from the pre-test cleaning of tank truck compartments would have "definite negative environmental consequences" (IV-F-4, IV-F-6).

Response: This commenter felt that 175 gallons of effluent composed of water, caustic-based cleaning compounds, and petroleum residue would be created during the tank cleaning necessary before each test for vapor tightness. Method 27 does not require a thorough soap-and-water cleaning as suggested by this commenter. The tank compartments must be emptied of all liquid, and then purged of all volatile vapors by any safe, acceptable method (such as carrying a load of nonvolatile fuel or flushing with ambient air). Only in an unusual case, where a noncompatible fuel or chemical was carried in a tank truck which was being converted to gasoline service at the time of the testing, would such liquid cleaning be necessary. Since these cases are infrequent and since the volume of effluent is small, the impact of any such instances would be negligible.

2.5 ECONOMIC IMPACTS

2.5.1 Underestimation of Industry Costs

Comment: One commenter stated that the "reasonably accurate cost estimate" required to demonstrate that the proposed standards are achievable at reasonable costs had not been presented because: (a) it is not reasonable to assume that control equipment designed to meet 35 mg/liter could be purchased and operated for the same costs as for current equipment meeting 80 mg/liter, and (b) the number of affected facilities expected in 10 years had been seriously underestimated, primarily because of facilities affected due to SIP conversion (IV-D-26).

Response: Many control systems being installed under SIP programs are capable of controlling emissions below the NSPS limit of 35 mg/liter.

Test data have shown that, in their normal operating mode, carbon adsorption (CA) and thermal oxidation (TO) units can consistently operate well below the 35 mg/liter limit (II-A-4, II-A-17, II-A-23, II-A-24, II-A-26, II-A-37, II-A-50, IV-D-54, IV-D-55, IV-D-56, IV-D-57). Therefore, for CA and TO units there are no additional costs involved in meeting 35 mg/liter versus meeting 80 mg/liter. Current carbon systems are designed for levels below 35 mg/liter (IV-D-36, IV-E-20).

Test results on current refrigeration (REF) systems show that only some of the units meet the 35 mg/liter limit. However, it should be remembered that most of these systems were installed to meet an 80 mg/liter standard. Conversations with the major manufacturer of these systems indicate that adjustments to operating parameters can be made which will increase the control efficiency (IV-E-32). Such adjustments would increase electrical costs (claims by the manufacturer of as much as 50 percent increase). The assumption that costs would not increase in the case of CA and TO units in order to meet 35 mg/liter is still considered valid. However, since it appears that the REF technology could be used to meet the standard, at somewhat increased capital and operating cost levels from the average current system (as much as 25 percent increase in capital cost and 50 percent increase in energy costs (see Section 2.5.3)), and since a large segment of industry is using this form of control (approximately 25 percent of existing units are refrigeration units), the potential cost impact to industry if current use patterns are maintained has been examined. Section 2.5.3 discusses the additional costs associated with REF units designed to meet the 35 mg/liter limit. Section B.2.1 of Appendix B examines the updated industry costs.

As pointed out in Section 2.3.1, §60.500(c) changes the applicability date for a terminal which commenced a loading rack component replacement program prior to the promulgation date for the purpose of meeting State or local regulations. This change in applicability dates excludes the vast majority of these terminals from the standards. The estimate of 55 facilities affected in the first five years, based on industry response to Section 114 letters, is still considered appropriate.

Comment: One commenter stated that EPA's estimate of both the number of systems requiring replacement by the industry and the cost of replacement were too low. His estimate was a $28 million nationwide capital cost over a 5-year period, as opposed to the $25.3 million estimated by EPA (IV-D-30).

Response: The nationwide cost estimates presented in Table 8-40 of BID, Volume I represented the best estimates possible using information from all segments of the bulk terminal industry. The principal unknowns in calculating total costs included factors such as decisions made by individual owners and operators as affected by a highly volatile market situation. EPA recognizes that only slightly different assumptions could lead to a nationwide capital cost estimate of $28 million, or 10 percent higher than previous estimates.

Since it is not the intent of the Agency to cover under reconstruction provisions the facilities which are converted in order to comply with SIP regulations, the estimate of 55 facilities affected in five years is still believed to represent a reasonable approximation, based on Section 114 letter responses. The current declining market situation could serve to decrease this number because of fewer terminal expansions. The updated industry costs have been used to recalculate the nationwide cost impact, with the costs of purchasing and operating continuous monitors now included in these estimates, even though monitors are not required by the standards at this time. By 1986, industry will spend about $12.2 million in capital investment, and the net annualized cost in the fifth year will be $2.5 million. The capital and annualized costs have decreased since the original evaluation mainly because of re-analysis of top-to-bottom loading conversion costs and because the promulgated regulation no longer contains a requirement for the upgrading, replacement, or the addition of add-on controls for existing vapor processing systems. In the previous analysis, the costs for the top-to-bottom loading conversions were attributed to the standards for all top loading terminals in the nationwide cost determination. However, in the revised evaluation, the cost of top-to-bottom loading conversions not coupled with vapor control, which would cause the facility to become affected through the reconstruction provisions, were not included in costs associated with the standards. These costs would be incurred by the terminal owner regardless of the standards since the conversion was performed voluntarily. Sections B.2.1 and B.2.2 of Appendix B discuss the revised costs and the assumptions used in calculating nationwide impacts.

Comment: Another commenter claimed that "the economic analysis for the 80 mg/liter standard underestimated the cost by 25 percent; thus the analysis for the 35 mg/liter standard may incur comparable error" (IV-D-19).

Response: The economic impacts of Regulatory Alternatives II, III, and IV were analyzed using the most up-to-date information available at the time the analysis was made. Since proposal of the standards, costs have been updated so that the impact of Alternative IV could be reassessed. In re-evaluating all cases involved with Alternative IV, it was found that the cost per unit of emission reduction for the addition of add-on controls to existing vapor processors or the replacement of existing vapor processors was unreasonable. For this reason and because it is not considered reasonable to require upgrading, add-on controls, or replacement for these vapor processors, the final standards have been revised to allow existing vapor processors to meet an 80 mg/liter emission limit instead of the 35 mg/liter limit. The remainder of the costs associated with Alternative IV, upon re-evaluation were found to be reasonable. No specific details clarifying the assertions of the commenter were given and the re-evaluation of the costs was felt to be thorough and accurate. The revised costs are presented in Section B.2 of Appendix B.

2.5.2 Economic Incentive to Control Emissions

Comment: One commenter felt that the proposal is unnecessary since, due to rising gasoline costs and the trend toward larger terminals, the industry will have an ever-increasing financial incentive to install vapor recovery equipment (IV-D-26). Another commenter felt that, if the statement that the proposed standards would result in a net energy savings were correct, then the economic incentive alone would be sufficient for industry to respond without the need for regulatory action (IV-D-12).

Response: A review of the net annualized costs to various model plants and to the industry as a whole, as summarized in Appendix B and Section 1.2.3, shows that bulk terminals would in most instances incur some positive net costs. Only among the larger terminals would net savings be expected, and even among these facilities, the cost of planning, designing, purchasing, and installing vapor recovery equipment might be sufficient to outweigh economic incentives and convince owners not to expend such effort. Also, while there may be cost savings, the incentive may not be so great as to warrant controlling emissons since greater investment opportunities exist elsewhere. In promulgating this NSPS, the Administrator is establishing minimum nationally uniform standards reflecting the best demonstrated technology, as required by Section 111. If the trend toward large terminals results in an ever-increasing financial incentive to install vapor recovery equipment, the cost and economic impacts attributable to the standards will be reduced.

Comment: One commenter pointed out that even the small cost per gallon to comply with the standards would be sufficient to discourage a terminal owner or operator from performing modifications at a terminal. The ultimate result of discouraging investment in present terminals could be the closing of some terminals with the net result of fewer terminals, increasing truck movement of products, and increasing overall pollution (IV-D-12).

Response: The results of both the original and revised economic analyses showed that for the two smallest model plants the standards could, in the worst case, have a significant negative impact on profitability in the unlikely absence of complete control cost pass-through. The original analysis on existing facilities showed that both the 380,000 liter/day and 950,000 liter/day terminals would encounter ROI's of less than 11 percent, taken to be the minimum acceptable level (Section 8.4.1.2.1 of BID, Volume I). The revised analysis (Section B.3 of this document) indicates that only the 380,000 liter/day top-loaded facility will experience a significant decrease in profitability with a post-control ROI range of 7.7 to 8.0 percent. The 950,000 liter/day terminal will still maintain a marginal profitability level with a post-control ROI range of 10.6 to 11.0 percent. However, the preceding impacts are worst-case scenarios and are very unlikely to occur. Since the price increase necessary to offset the control costs is less than 0.5 percent, the most likely scenario will involve an impact with most of the control costs passed through and very little cost absorption. Under this scenario no existing terminals are expected to close. The industry profile did forecast a trend away from new small bulk terminals to larger terminals; however, this is a result of ongoing technological advances and economies of scale, and of a changing market situation. This trend is not expected to be accelerated by the implementation of the standards.

2.5.3 Vapor Processor Costs

Comment: One commenter claimed that the EPA estimate of the unit purchase cost for a carbon adsorption (CA) vapor recovery system is low by about 4 percent, while the installation cost is underestimated by 40 percent (if the facility has bottom loading) or by at least 320 percent (if the facility must convert from top to bottom loading). Purchase and installation costs of the CA units were presented by this commenter on a per-facility basis (IV-D-37, IV-D-38, IV-E-19). Another commenter submitted cost data indicating typical vapor recovery and bottom loading expenditures of $254,000 and $805,000 per terminal (2 racks), respectively (IV-E-19).

Response: Most carbon adsorption units are currently being produced by two manufacturers. The purchase costs used in the cost analysis were received from the one major manufacturer at the time the analysis was performed (mid-1979). Since proposal, estimated costs have been updated through contacts with both manufacturers (IV-E-20, IV-E-36), and are presented in Section B.2.1 of Appendix B. Current average CA unit prices are lower than the previously presented prices by 20, 16, 12, and 7 percent, respectively, for Model Plants 1, 2, 3, and 4.

The average cost of installing a vapor processor was estimated as 85 percent of the initial purchase price of the unit, based on 14 actual installations. Values used to compute the average installation cost ranged from 37 percent to 147 percent. Since no trend in this percentage as a function of purchase cost or unit type was noted, a single value representing the average was selected. Consequently, some unit installation costs will be higher and some lower than those presented in the analysis. As shown in Table 8-20 of BID, Volume I, the cost elements considered in this figure included such items as engineering and approvals, pad, piping, electrical, condensate tank, and other elements concerned directly with the processing system. Loading rack conversion costs were presented as separate cost elements (BID, Volume I, Tables 8-32 through 8-34). Data on 13 installations submitted by the first commenter indicated average costs of $192,100 for the vapor processor, $220,400 for processor installation, and $142,000 for minor loading rack modifications (half were already bottom loading and the remainder were modified rather than rebuilt). Processor installation costs are seen to average about 115 percent of the purchase price of the processor, which is consistent with the range of values considered in deriving EPA's 85 percent figure. The second commenter submitted data showing that the typical installation cost for a refrigeration unit at his terminals was $90,000, or 55 percent of the $165,000 purchase price. Again, this percentage falls within the range of values considered previously by the Agency.

The cost of loading rack conversions varies widely throughout the industry. In converting racks from top to bottom loading, a terminal may incur expenses for design and planning work, demolition, loading rack equipment, delivery pumps, piping, electrical service, fire protection, concrete drive and drainage, office and canopy structures, and a host of other miscellaneous equipment and expenses. The total sum spent for such work is largely dependent on the previous condition of the terminal and the current requirements and preferences of the terminal owner. Recent contacts with construction contractors who have experience with loading rack conversion work indicate that EPA's previous estimate of $160,000 (BID, Volume I, page 8-53) is toward the low end of the current cost range for such conversion work (IV-E-33, IV-E-39). To reflect these cost changes, the estimate for the conversion cost for a loading rack is increased to $200,000, and is incorporated in Table B-2 of Appendix B. In the absence of a more detailed breakdown of the commenter's data, EPA must presume that the higher cost figures reported by the commenter include the cost of several aspects of conversion not attributable to these standards.

Comment: Two commenters stated that operating (electrical) costs presented for some vapor recovery systems are in error. One of them forecasted that refrigeration systems designed to meet the proposed 35 mg/liter limit would require 25 percent more capital investment and cost about 50 percent more for electric power than systems designed to meet 80 mg/liter (IV-E-19, IV-F-1, IV-F-3). The other commenter stated that instead of the refrigeration unit consuming twice as much power as a comparable carbon adsorption unit, as presented in BID, Volume I, the refrigeration unit actually requires 50 to 60 percent of the power consumed by carbon adsorption. This commenter also felt that estimates of electrical costs should be based on field data, and not only on manufacturers' claims (IV-D-53, IV-F-1).

Response: Operating costs for all control technologies discussed in BID, Volume I were calculated using electrical consumption data supplied by the system manufacturers. The refrigeration (REF) unit purchase cost and electrical consumption figures collected in 1979 applied to systems used to achieve the SIP limit of 80 mg/liter. The data have subsequently been reassessed using more current costs.

The manufacturer of essentially all of the current REF units was contacted to obtain present purchase and operating figures which would be reflected for a system to meet the emission limit of 35 mg/liter (IV-E-32, IV-J-8). Unit models were selected for application to the four model plants, based on the parameter suggested by the manufacturer, peak hourly product loading. For example, Model Plant 2 is estimated to have a peak hourly loading of 290,000 liters per hour (76,500 gal/hr). The selected REF unit has a peak hourly capacity of 380,000 liters/hr (100,000 gal/hr) in the operating mode which limits emissions to 40 mg/liter (considered equivalent to 35 mg/liter for costing purposes). The corresponding daily capacity of this unit according to the manufacturer is 3,800,000 liters/day (1,000,000 GPD), or 4 times the model plant's daily throughput. Units for the other model plants were specified with a similar amount of excess capacity, so that cost estimates would be conservative. The price of this unit is $138,150, and it operates at an average of 88.4 kilowatts of power. Annual power costs have been calculated as before, assuming 12 hours per day and 340 days per year of operation, and a utility cost of $0.06 per kilowatt-hour ($21,640 per year for this model plant). The purchase price is 19 percent lower than the previous price of $170,000 used in BID, Volume I, and the power cost is 6 percent higher than the previous figure (Tables 8-19, 8-31, and 8-34 of BID, Volume I). This manufacturer has indicated that improvements to the technology are still being made, which are expected to increase efficiency and reduce costs (IV-E-3).

Another reason stated by this manufacturer for reduced prices was that units in the past had been greatly oversized with respect to actual requirements (IV-F-1). Further, the new generation of units being most widely marketed (and different from the units previously costed) is characterized by lower capital costs (IV-E-32). The unit purchase and electrical operating costs reported in BID, Volume I were not simply increased by 25 and 50 percent, respectively, as suggested by the first commenter in order to estimate current costs of the more efficient units. Because of the factors noted above, the previously reported costs would not represent a reliable cost baseline. Instead, actual prices and power requirements provided by the manufacturer for units specified to meet 40 mg/liter were used to evaluate the impacts of the standard (IV-J-8). The updated costs are presented in Section B.2.1 of Appendix B. EPA considers the updated costs, presented in Tables B-1 and B-2 for refrigeration systems designed to meet 35 mg/liter, to be reasonable.

In order to assess the cost impact of Regulatory Alternative II (emission limit of 80 mg/liter), the purchase price and electrical operating costs of REF units specified to achieve 80 mg/liter were examined using the manufacturer's current specifications (IV-J-8). These specifications indicate that while unit purchase cost is higher when a larger unit is specified, the electrical costs of achieving a limit near 35 mg/liter may actually be lower. However, the relationship of these costs changes as different sized units are selected to provide various levels of reserve capacity. Based on this analysis, the figures claimed by the first commenter were assumed to constitute a worst-case cost scenario to a REF unit user. The purchase costs of units meeting 80 mg/liter were taken directly from the price list, but electrical costs used in the assessment were calculated as 50 percent higher than the costs for 40 mg/liter systems. This assumption introduces a measure of conservatism into the cost analysis of Alternative II, but does not have a major effect on the net annualized costs.

Field data on power costs for REF units are scarce because most users do not measure the individual electrical consumption for the units themselves. One terminal owner whose unit was tested at 97.5 percent control efficiency (achieving 35 mg/liter) reported a consumption of 38,600 kW-hr per month at his 875,000 GPD terminal (IV-D-47). The equivalent annual cost of $27,800 compares well with the Model Plant 3 and 4 costs of $21,600 and $28,600, respectively, presented in Appendix B. The unit manufacturer estimated the electrical operating cost for equipment achieving 35 mg/liter as $0.0000226 per liter of gasoline transferred (IV-F-3). Based on this figure, annual power costs for Model Plants 1, 2, 3, and 4 would be $2,900, $7,300, $14,600, and $29,200, respectively. While these figures compare with the Appendix B estimates for the larger terminals, they are significantly lower for the small terminals. Thus, the presented annualized costs for small terminals selecting REF units may be conservative, and the cost impact may be overestimated. Current estimates, however, are considered to represent sufficiently accurate averages for the purpose of determining cost impacts.

The power costs for current carbon adsorption (CA) units were calculated in the same manner as those for REF units, based on information supplied by the two major CA unit manufacturers (IV-D-51, IV-E-20, IV-E-36). The following table shows the comparative requirements for the two types of systems:

Model Plant		REF Unit	Average for CA Units from Two Manufacturers
1	Operating Kilowatts (Hours per Day)	78.2 (12)	23 (14)
2		88.4 (12)	32 (15)
3		88.4 (12)	37 (20)
4		117 (12)	63 (22)

As mentioned earlier, the REF units have been specified with considerable reserve capacity, so that the power figures may be conservative with respect to the model plants. Annual electrical costs for REF units are calculated to be 189, 119, 43, and 1 percent higher than the average costs for CA units, for Model Plants 1, 2, 3, and 4, respectively (Tables B-1 and B-2). Section B.2.1 of Appendix B presents a summary of these costs.

Field data on CA system electrical costs also have not been gathered by most users. Two operators have recently reported monthly costs of about $500-900 for smaller units and $1200 for larger units (IV-E-40, IV-E-42). These costs correlate well with Appendix B estimates for the small terminals, but are somewhat lower than estimates for the larger terminals.

Comment: One commenter indicated that the average maintenance expense for a carbon adsorption (CA) vapor recovery system was underestimated by 50 percent. He estimated that the average annual maintenance cost per terminal is at least $13,300, which does not include daily preventative maintenance checks (IV-D-37, IV-E-19).

Response: As discussed on page 8-45 of BID, Volume I, the amount spent by terminals for maintenance is dependent on many factors (such as whether union labor rates are in effect, maintenance performed by in-house personnel versus outside contract service, etc.). Most of the costs submitted by the commenter applied to new units in operation less than one year, and were extrapolated to calculate annual costs. Several operating problems, many of them resulting from extreme winter conditions, were described. These problems, some of which have been remedied, undoubtedly contributed to the $13,300 annual average calculated cost reported by the commenter. These costs ranged from 3.5 to 11.9 percent of the equipment purchase cost, averaging 7.1 percent. While many users have not accumulated maintenance cost estimates because their units are quite new (IV-E-41, IV-E-42), one operator estimated annual maintenance of CA systems to be 3 percent of the purchase price (IV-E-40). One CA unit manufacturer estimated this cost as about 2 percent of the purchase price of the equipment (IV-D-36, IV-D-51). The estimate presented in BID, Volume I, 4 percent of purchase cost, is considered representative of CA units nationwide, based on the information considered prior to proposal of the standards, and on more recent industry estimates.

2.5.4 Costs Associated with Emission Limit

Comment: One commenter felt that the achievability of the 35 mg/liter limit has not been adequately demonstrated, taking into consideration the cost of achieving the limit (IV-D-26). Two other commenters expressed the opinion that the proposed 35 mg/liter standard is based on a calculated cost-effectiveness which does not reflect true costs and emission reductions. One pointed out that EPA estimated a cost-effectiveness of $632 per ton of VOC controlled for an 80 mg/liter limitation, whereas State experience under SIPs has shown a cost-effectiveness of $1,200 per ton of VOC controlled at an 80 mg/liter standard. The incremental cost of achieving a 35 mg/liter standard seems unreasonable considering the small net improvement in air quality (IV-D-25, IV-D-31).

Response: The cost-effectiveness figures presented in Table 8-40 of BID, Volume I were based on the most current information available on actual costs of vapor control system installations as reported to EPA. The figures apply to a nationwide distribution of regulatory coverage, and take into account a mix of terminal sizes, processor types, and necessary terminal conversion work. The commenter did not supply a breakdown of costs to support the $1,200/ton figure, but in a followup conversation (IV-E-52), it was learned that the figure was based on 12 installations at his own company of CA systems at medium-size terminals (about 625,000 liters/day). For each case, the cost to convert the loading racks from top to bottom loading was included.

Since the commenter did not supply a detailed cost breakdown, the cost elements contributing to the higher cost-effectiveness cannot be identified. However, since all of the commenter's terminals required major loading rack conversion work, this is considered to be the most likely reason for the difference. As shown in Tables 8-29 and 8-32 of BID, Volume I, the cost-effectiveness for an existing bottom loading Model Plant 2 terminal installing a CA unit is estimated to be $0.12/kg, while the cost-effectiveness for a top loading terminal which must convert to bottom loading is about $0.52/kg. Thus, the commenter's costs may be biased toward the high end of the cost range. It should be remembered that since the figure of $632/ton represented a national average, individual cases will likely be higher or lower.

The estimated costs of control for the standards have been re-evaluated and are presented in Table B-4 of Appendix B. Revised cost-effectiveness figures are presented in Table B-3 of Appendix B. The Agency believes that these figures demonstrate that the costs associated with the selected alternative are reasonable, and the intent of the Clean Air Act is satisfied. Discussions about the environmental impacts of the standard are contained in Section 2.4.

2.5.5 Other Terminal Costs

Comment: One commenter pointed out that EPA's estimate of "operating labor" at $3,400 per year for each affected terminal, to ensure that only vapor-tight gasoline tank trucks use the facility, totally ignores the operating practice of the gasoline bulk terminal industry. The "real world" cost of operating labor alone to comply with the proposed standards would be $37,889,180 per year by 1990 (assuming EPA's 110 affected terminals), which far exceeds anything considered by EPA in the rulemaking. These costs not only would be certain to drive many independent terminals out of business, but demonstrate that the proposed standards are not cost-effective (IV-D-35).

Response: As pointed out on pages 8-43 and 8-45 of BID, Volume I, the operating labor cost considered in the tables reflected the daily unit inspections and the monthly system leak inspection. Estimated to average one hour per day, the annual cost at $10 per hour would be $3,400. To reflect labor rate increases in the past two years, the hourly rate has been increased to $15 per hour in the revised costs presented in Section B.2.1 of Appendix B, producing a per-terminal cost of $5,100 per year. The cost to 110 terminals over 10 years would be about $0.56 million.

The commenter presumed that at least two extra personnel, to check the vapor tightness documentation of tank trucks as they enter the terminal, and to check hose connections, would be required at each affected terminal. These extra personnel are not in fact required under the regulation, and will not be needed to carry out the provisions of the regulation. Section 2.9.1 discusses the question of additional personnel and tank truck vapor tightness.

Comment: One commenter stated that vapor processor energy consumption calculations introduced a major error into BID, Volume I. The energy consumed at the generating station should have been used in the calculations to avoid an overstatement of net energy recovery. Overall energy consumption was underestimated by a factor of 10 (IV-D-23).

Response: The net energy consumption of a model plant is calculated by subtracting energy equivalent of the amount of recovered product from the energy required by the plant to control emissions to the level of the standard. The national energy impact on the industry represents the total net consumption of all terminals affected under NSPS. If the energy consumed at the generating station to produce the electricity for the terminal were used in the calculations, the amount of energy saved which would have been spent to produce the gasoline at the refinery would have to be calculated to make comparisons on an equivalent basis. A comparison of costs and credits on such a basis is considered neither logical nor practical by the Agency.

Comment: One commenter felt that there would be no economic benefit to an emission limit more stringent than 80 mg/liter because the operating costs would become excessive in relation to the value of the recovered product (IV-F-1).

Response: The emission limit of 35 mg/liter was selected for new vapor processing systems to reflect the performance of the best available control systems as required by Section 111 of the Clean Air Act, and not necessarily to assure that each facility operator realizes the maximum return due to recovered product. For some systems, the operating cost of an 80 mg/liter system may be less than the cost to operate the more efficient systems achieving 35 mg/liter. However, the Agency's concern in evaluating alternative emission limits is with the economic impact of each particular alternative on the industry and on individual plants. The economic analysis was thoroughly reviewed and showed that attainment of the limit would not result in an unreasonable cost or economic burden for those affected facilities installing new vapor processing systems. The review of costs and other factors did indicate that the costs for replacing or adding additional control onto an existing control device may be unreasonable. For this reason, affected facilities with existing control devices are required to meet an 80 mg/liter limit instead of a 35 mg/liter limit. The costs of complying with the regulation have been updated, the economic impact has been re-examined, and these assessments are presented in Appendix B.

2.5.6 Tank Truck Costs

Comment: One commenter questioned the estimated costs for retrofitting and testing tank trucks. He estimated the retrofit cost for a four-compartment trailer to be $8,800, instead of the $6,400 given in the preamble. In addition, some costs associated with the vapor tightness testing were not considered, including cleaning, purging, and reinspection and hydrostatic retesting of tanks. Loss of revenue due to the tank downtime caused by testing was also cited as a missing cost element (IV-F-4, IV-F-6). A second commenter questioned EPA's cost estimate of $400 per compartment for tank truck vapor recovery conversions. This commenter also felt that the proposed regulations would create undue economic hardship and paperwork for those bulk plants which operate a small number of tank trucks. Particularly significant are tank truck conversion costs and the revenue lost as a result of the time required to take tank trucks out of operation (at least one day) for testing (IV-D-11).

Response: Estimated costs were presented in BID, Volume I, for conversion of top loading trucks to bottom loading, addition of vapor recovery provisions to new and older tank trucks, and for the annual vapor tightness test for delivery tanks. Conversion to bottom loading was estimated at $4,000 (page 8-63), vapor recovery at $1,600 for new trucks (page 8-39) and $2,400 for the average older truck (page 8-63), and the vapor tightness test at $150 (page 8-46). These costs have been re-evaluated through contacts with companies which perform tank truck conversion work (IV-E-22, IV-E-23, IV-E-24, IV-E-25, IV-E-26).

In the cost re-evaluation in Appendix B, several costs have been revised. Conversion shops have indicated that the cost for bottom loading and vapor recovery retrofitting ranges from $6,400 to $8,000 for pre-1967 tank trucks, from $4,800 to $7,200 for 1967-75 tank trucks, and from $4,400 to $4,800 for tank trucks manufactured after 1975. Thus, the previous estimate of $6,400 still represents an accurate average cost for the overall population. However, the estimates of $1,600 and $2,400 for vapor recovery addition to new and older trucks, respectively, have been increased to $2,000 and $3,000, based on updated cost information. The cost for incorporating vapor recovery provisions is revised to $500 and $750 per compartment for new and older tank trucks, respectively. The actual cost for the annual vapor tightness testing is still estimated to be $150, but a cost impact for loss of revenue due to downtime has been included in the testing cost. Data submitted by the first commenter indicate a downtime cost per day of $300 (IV-D-44); this has been added to the cost of a test, which would take approximately one full day to perform if a tank truck firm had the test performed by an independent shop. The added cost to terminals, which generally have the facilities to perform their own testing, would be the one-half day cost of $150. The revised annual testing costs are thus $450 for tank truck firms and $300 for bulk terminals.

The smaller businesses will generally be most affected financially by this regulation. Although the original economic analysis found that both the 380,000 and 950,000 liter/day terminals would encounter ROI's of less than 11 percent, the final impact on these plants will be minimal since most of the control costs can be passed through in the form of higher rates (see Section 2.5.6). The economic impacts are re-examined in Section B.3 of Appendix B.

The regulation imposes no direct paperwork requirements on operators of bulk plants which receive gasoline in their own tank trucks from bulk terminals. However, since a verification of each truck's vapor tightness must be kept on file at the affected terminal (§60.505(a)), the tank truck owner would have to supply test documentation for these tank trucks annually. This paperwork would be minimal, especially for operators of a small number of tank trucks.

Comment: Another commenter stated that, due to the limited financial resources of the independent tank truck owner, such owners would be unable to comply with the vapor tightness requirements of the regulation. As a result, the small business tank truck owner would be refused access to an affected bulk terminal (IV-D-18).

Response: The original economic analysis in BID, Volume I (Section 8.4) used the debt service coverage analysis to assess whether firms can meet the increased annual debt service costs under controls. The debt service coverage ratio is defined as a firm's cash flow divided by its current maturity of long-term debt. If this ratio is 2.0 or higher, debt service coverage is considered to be healthy, but if it is less than 1.0 the annual debt service costs cannot be met and the firm will find its access to capital markets restricted.

The original economic analysis suggested a decrease in the debt service coverage ratio from the range of 2.1 to 2.4 to the range of 1.7 to 2.2. This decrease does represent a slight increase in lender risk, but not enough to affect the capital financing capability of the independent tank trucking firms. Therefore, access to capital markets for financing air pollution control measures would not be impaired by the regulation.

2.5.7 Ability to Pass Through Control Costs

Comment: Two commenters stated that the costs of tank truck control cannot be easily passed through to the consumer by common carriers (IV-D-11, IV-F-4, IV-F-6). One of them further stated that the proposed rule would "tend to eliminate" bulk plant operations. These smaller operators could not remain competitive with major oil companies, since control costs would have to be absorbed and the profit margin reduced (IV-D-11). One commenter stated that EPA has failed to recognize that pipeline companies may be legally unable to pass through costs. Most pipeline companies are common carriers whose rates are regulated by the Federal Energy Regulatory Commission (FERC). To pass through a cost, the company must publish a new tariff with FERC. A pipeline tariff may be denied, suspended, or modified, and it may take years before an increased tariff rate is fully in effect. EPA must consider this tariff process in its economic analysis of the proposed regulation (IV-D-35).

Response: According to the Motor Carriers Act of 1980, Section II, 49 U.S.C. 10708, the tank truck operators are allowed to increase their rates by 10 percent per year without any restrictions, and beyond the 10 percent per year level with the provision of protest by customers and a followup investigation by the Interstate Commerce Commission (IV-E-46). The cost pass-through analysis from the original economic analysis in BID, Volume I revealed a range of necessary rate increases from 0.6 to 3.0 percent. This range of values is substantially less than the unrestricted 10 percent per year limit; therefore, no regulatory-related rate problems of cost pass-through are forecasted for the independent tank truck industry.

Pipeline companies must apply for rate increases with the FERC. According to the FERC, the average processing time for an application to increase their rates is 10 to 12 months. However, the pipeline company is allowed to increase its rates, subject to refund, 5 months after the application date. Any divergence from the average processing time is usually due to inaccurate presentation and documentation of the increased operating costs (IV-E-45). Based on these findings, no unfair economic hardship would be created for the pipeline industry.

The original economic analysis found no significant impact resulting from the proposed standards even when complete control cost absorption was assumed, and no plant closures resulting from the standards were forecast. The industry profile did forecast a trend away from new small bulk terminals to larger terminals; however, this trend is not expected to be accelerated by the implementation of the regulation.

2.6 EMISSION CONTROL TECHNOLOGY

2.6.1 State-of-the-Art Equipment

Comment: One commenter stated that the EPA test data presented in the BID do not represent the present state-of-the-art in vapor recovery equipment (IV-D-53, IV-F-1).

Response: Most EPA-sponsored testing of vapor control systems at bulk terminals was performed between November 1973 and October 1978. Test sites and vapor processors were selected to represent the various control technologies which were being widely used to control loading rack VOC emissions. At the beginning of the standards development in November 1978, the data from these tests constituted most of the available information on the performance of these systems. Since these tests were performed, the state-of-the-art in the reliability and collection efficiency of processors has advanced considerably. Test results on newer systems are being evaluated as they become available, and all of the most recent information has been considered in drafting the final rule. Data received after proposal on over 40 days of testing on CA, TO, and REF control systems indicate that all test results, except for one of the REF tests, are below the proposed limit of 35 mg/liter. These results are summarized in Appendix A.

2.6.2 Test Data Presentation

Comment: This commenter also felt that the data presentation should indicate the actual volume of air-vapor mixture which passed through the processing units during testing, as well as the system backpressure contributing to vapor leakage (IV-D-53, IV-F-1).

Response: The EPA test data presentation in BID, Volume I, (Tables 4-1 and C-1) indicated the approximate daily gasoline throughput of each terminal test site, in order to provide an indication of the capacity of each vapor processor. The actual volume of air-vapor mixture passing through the processor depends on the actual product throughput during the test period, any vapor growth or shrinkage in the vapor return line, and the amount of system leakage, primarily at the tank trucks. The volume of vapor returned from loading per volume of liquid loaded ($(V/L)_r$), the potential volume of vapor returned, if no leakage occurred, per volume of liquid loaded ($(V/L)_p$), and the ratio of these parameters (F factor) are presented in Table C-1, and indicate the effect of the abovementioned variables on the processed volume, relative to the amount of product actually loaded during the test. This information is considered sufficiently detailed to allow evaluation of control system performance.

During each test (except Test No. 4) the average static pressure in the vapor return line near the tank truck was recorded for each loading. Table 2-4 summarizes the backpressure data recorded in the EPA-sponsored emission tests and presents data obtained after proposal from six tests performed in California. The test numbers for the EPA-sponsored tests in Table 2-4 correspond to the test numbers assigned

TABLE 2-4. VAPOR RETURN LINE PRESSURES DURING LOADING[a]

Test No. (Reference)	Type of Unit[b]	Lowest Pressure (mm H_2O)	Highest Pressure (mm H_2O)	Mean Value (mm H_2O)	No. of Readings
EPA-Sponsored Tests					
1 (II-A-17)	CA	229	386	318	29
2 (II-A-26)	CA[c]	107	218	183	20
3 (II-A-37)	CA	36	107	56	40
4 (II-A-4)	TO[c]	d	d	d	d
5 (II-A-24)	TO	51	165	119	37
6 (II-A-50)	TO	30	330	152	30
7 (II-A-23)	TO[c]	25	178	97	52
8 (II-A-5)	REF	25	241	66	24
9 (II-A-10)	REF	5	64	25	38
10 (II-A-14)	REF	28	307	124	39
11 (II-A-40)	REF	8	76	33	41
12 (II-A-41)	REF	20	193	81	46
13 (II-A-43)	REF	8	165	46	56
14 (II-A-6)	CRA[c]	15	419	117	20
15 (II-A-11)	CRA[c]	64	140	107	43
16 (II-A-28)	CRA[c]	30	132	74	54
17 (II-A-29)	CRA[c]	20	127	76	19
18 (II-A-42)	CRA[c]	127	470	236	59
19 (II-A-38)	CRA[c]	25	236	84	65
20 (II-A-27)	CRC[c]	33	343	104	38
21 (II-A-39)	CRC[c]	38	371	175	34
22 (II-A-25)	LOA	18	279	124	33
Tests Received After Proposal					
1 (IV-J-16)	CA	254	533	417	12
2 (IV-J-2)	CA	305	610[e]	381	7
3 (IV-J-3)	CA	127	483	333	21
4 (IV-J-4)	REF	51	305	85	9
5 (IV-J-1)	REF	97	208	142	11
6 (IV-J-5)	TO	51	178	125	14

TABLE 2-4. VAPOR RETURN LINE PRESSURES DURING LOADING[a] (Concluded)

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[a] Average gauge pressure at loading rack during tank filling.

[b] CA - Carbon Adsorption

TO - Thermal Oxidation

REF - Refrigeration

CRA - Compression-Refrigeration-Absorption

CRC - Compression-Refrigeration-Condensation

LOA - Lean Oil Absorption

[c] Vapor holder in collection system.

[d] Pressures not measured in this test.

[e] Highest value occurred during the simultaneous loading of two compartments.

in Tables 4-1 and C-1 of BID, Volume I. The mean value of pressure for 21 of the 22 EPA-sponsored tests ranged from 25 to 318 mm of water (1.0 to 12.5 inches of water), averaging 112 mm of water (4.4 inches of water) pressure. The required collection system maximum pressure of 450 mm of water was exceeded during only two tank truck loadings in one test of a CRA type unit (Test No. 18). For the California data, the backpressure for the CA systems was consistently higher than that of the REF and TO systems. A total of 8 of the 40 truck loadings tested exceeded the 450 mm of water pressure value. It was determined that a majority of these cases took place at a terminal where the high backpressure was due to faulty check valves in the vapor line more so than the type of control device (IV-E-54). This emphasizes the fact that since this pressure is measured close to a loading tank truck, the backpressure includes pressure drop contributions from the number of arms loading at one time and from variables in the collection system itself (such as length and diameter of piping, elbows and joints, liquid traps, and in-line valving), as well as from the processor. Even though these carbon adsorption backpressures were higher than for other systems, the data illustrated that a properly designed vapor collection system in conjunction with a CA vapor processor can operate below the 450 mm of water limit.

The emission test reports (reference numbers in Table 2-4) provide more detailed information on processed volumes and system backpressure.

2.6.3 Adequate Demonstration of Technology

Comment: Several commenters remarked that the technology to achieve the standard has not been demonstrated, because only a few short-term tests were performed. These commenters stressed the necessity for data on continuous performance, and on the ability of the systems to achieve the limit over the long term (IV-D-19, IV-D-20, IV-D-26, IV-D-53, IV-E-19, IV-F-1, IV-F-3).

Response: Although vapor recovery at bulk terminals has been used in California for over 20 years, the current generation of control units has been in operation only since about 1977. Most EPA testing was performed between November 1973 and October 1978, and thus represents the performance primarily of older systems (Section 2.6.1). The types of control systems which represented the newest technologies and with the consistently lowest TOC mass emission rates were selected as the best demonstrated technology, and the emission limit was based on these systems.

Since the beginning of the standards development, the Agency has sought the most recent results of tests performed by oil companies and State agencies, in order to collect the best possible data base. Since all of the tested systems were installed in response to SIP limitations at or near 80 mg/liter, oil company and system manufacturer technical representatives were consulted in order to determine the assumed design conditions for the installed systems and the collection potential of the various control technologies. Emission test results on several CA units tested between 1979 and 1981 representing over 30 days of testing have been received from four State agencies and one control system manufacturer (IV-D-49, IV-D-54, IV-D-55, IV-D-56, IV-D-57, IV-J-2, IV-J-3). Outlet TOC mass emissions measured in these tests ranged from 0.34 to 17.9 mg/liter, with 28 of the daily test values below 10 mg/liter. Three REF units owned by a single oil company in two States were tested in 1980 and 1981 (IV-B-2, IV-D-55, IV-J-4). Daily average emissions in these tests were 21.9, 22.6, and 41.8 mg/liter. These results support the observation that current REF units vary with respect to the 35 mg/liter limit, with some units above and some units below the limit. The apparent reason for this is that the control settings (compressor cut-in set point) can serve as a thermostat to maintain a desired range of condenser temperatures, which means that a range of emission levels is possible from a particular unit (IV-E-32). Recent tests by two State agencies on straight TO and compression-oxidation hybrid systems yielded daily average emissions of 0.20 and 0.22 mg/liter for the TO systems (IV-D-55) and 0.22 mg/liter for the hybrid system (IV-J-5). The hybrid system is capable of some degree of gasoline recovery; however, this has not been adequately quantified (see Section 2.6.9).

Even though these recently obtained test reports did not follow the EPA procedures exactly, the Agency feels that these data demonstrate the ability of the new systems to meet 35 mg/liter and finds no basis for these commenters' apprehension about the eventual inability of the best control systems to achieve the required emission limit. As is the case with all complex mechanical systems, adequate routine maintenance and occasional component replacement are necessary if design performance levels are to be maintained. However, no specific components or subsystems of the best systems have been identified which cannot be maintained so that adequate system performance is achieved over an extended period. Terminal operators and control system manufacturers were contacted to determine the extent and the cost involved in performing normal maintenance on the processing units necessary to maintain the units in proper operating condition. These costs have been incorporated into the cost and economic impacts contained in Chapter 8 of BID, Volume I, and Appendix B of this document.

2.6.4 Test Data Calculations

Comment: One commenter stated that the presented test data have gross errors so large that a comparison of control systems is impossible. Much of the error in the "Processor VOC Emissions" column of Table 4-1 of BID, Volume I, was attributed to the "complicated" EPA calculation method (IV-D-34).

Response: The data presented by EPA are not in error. EPA's calculation procedures are direct and not based on assumptions or indirect calculation of a parameter. There are differences between EPA's and the commenter's results because the procedure used by the commenter includes assumptions which are not appropriate for this application.

For example, in the EPA procedure the outlet volume is measured directly, whereas the commenter determines the volume indirectly from other measured parameters. The differences in the results for thermal oxidizers occur because the commenter's equation assumes an air balance which does not account for the dilution air that is necessary to the operation of this control device. Furthermore, the commenter's emission values are obtained from a single calculation using average parameter values for the entire 4- to 10-hour test period. EPA's results, on the other hand, are obtained using specific values for each 5- to 20-minute test interval.

2.6.5 Equipment Operation Under Variable Conditions

Comment: Two commenters stated that it has not been shown that the proposed standards are achievable under all the variable operating conditions that may be present throughout the industry (IV-D-26, IV-D-28).

Response: These commenters did not identify any specific variable operating conditions which they felt may affect emission levels, nor was any technical information included with the comments. The typical performance test on bulk terminal control systems does not measure operating parameters and their possible effect on emissions, because generally all that is required in these tests is the outlet mass emissions or control efficiency average over several hours. However, EPA collected data in its test program and has identified the following variables as having a possible effect on the mass emission level or control efficiency of the control technologies considered capable of achieving the emission limit of the standard:

1. Gasoline composition. Gasolines with different Reid vapor pressures (RVP) are marketed in different seasons of the year, in order to maintain approximately constant actual vapor pressure as mean ambient temperatures change. For example, in Southern California, the mean average RVP is approximately 8.4 in summer, but is increased to 11.2 in winter (II-D-149). Under winter conditions, therefore, mass emissions may be higher for some systems because of increased light ends in the inlet vapors. If CA and REF units are sized with sufficient collection area to meet the emission limit in winter, emissions in summer will then be well below the limit. TO systems are often designed to handle saturated streams stored in vapor holders, and should not be affected by the variable RVP. EPA tests and the tests in Appendix A show that the emission limit was achieved at various times of year and therefore under various gasoline compositions.

2. Inlet TOC concentration. Both CA and REF systems have been tested under a range of inlet concentrations returned from tank trucks (Appendix A and BID, Volume I, Appendix C), and theoretical estimations and analyses have indicated that these systems will collect efficiently throughout a range of concentrations (IV-A-2, IV-D-38). Efficiencies,

in fact, are likely to increase with increasing inlet concentration (Section 2.6.8). TO systems are easily designed to handle saturated inlet streams.

3. Peak loading levels. Most control systems are designed for peak loading hours at a terminal, rather than daily throughput, because of the fluctuation in loading activity throughout the day. Thus, a properly sized unit can handle peak periods, and should have improved performance during the remainder of the day. As pointed out in Section D.3.1 of BID, Volume I, it is recommended that testing be conducted during the 6-hour period in which the highest throughput normally occurs; at least 300,000 liters of gasoline must be loaded in order for the test to be valid. Therefore, the test results considered valid by the Agency reflect representative normal operation at a terminal during periods of the highest input to the unit.

The conclusion can be drawn that the operational variables at a terminal are merely design variables which affect the selection and sizing of the vapor processor. No variables have been identified which would prevent the standard from being met on a consistent basis.

2.6.6 Additional Test Data

Comment: Three commenters felt that no change in current emission limits should be considered until additional data on system performance have been obtained (IV-D-53, IV-E-19, IV-F-1, IV-F-3).

Response: The Agency has carefully considered test results on six control technologies tested between 1976 and 1981 at about 60 bulk terminals. These results are presented and discussed in Appendix C of BID, Volume I, and Appendix A of this document. These data are considered sufficient to adequately evaluate the performance of currently available types of control systems.

2.6.7 Carbon Adsorption (CA) Control Technology

Comment: Two commenters felt that the CA system might have difficulty meeting even an 80 mg/liter standard under the Stage I situation of richer vapor mixtures returned to the unit (IV-F-1, IV-F-2, IV-E-19).

Response: Theoretical projections of the performance of both carbon adsorption and refrigeration systems indicate that increasingly more concentrated inlet streams will be collected with increasing efficiency (IV-A-2, IV-D-38, IV-E-36). Test data are insufficient to determine the exact relationship of these two parameters, but some EPA tests indicate that the CA type system is capable of high collection efficiency and low outlet emissions under inlet concentrations higher than the 35 percent, as propane, expected in Stage I areas. In Test No. 1 of BID, Volume I, daily average inlet concentrations of 60.4 and 48.8 percent as propane were accompanied by control efficiencies exceeding 99 percent, and by outlet mass emissions of 8.5 and 3.9 mg/liter, respectively. In Test No. 3, concentrations of 45.0 and 40.1 percent were controlled at over 98 percent efficiency, with outlet emissions of 11.0 and 9.7 mg/liter, respectively. Another test performed in California, where Stage I controls and vapor-tight tank truck requirements are in effect, indicated that the emissions from a CA system were less than 12 mg/liter with an inlet concentration of over 40 percent (II-D-149). These data indicate that the 35 mg/liter emission limit can be achieved by properly operated CA units throughout the range of inlet concentrations which may be encountered at terminals affected by these standards.

Thus, no basis has been found which indicates the inability of carbon adsorption to control the higher concentration vapor streams expected in Stage I areas to the outlet emission rate required by the standards.

Comment: One commenter felt that EPA should not have omitted test data considered unrepresentative of CA system performance in its evaluation of the system, because these data represented normal conditions. The commenter believes these data indicate a rapid deterioration in system efficiency for the carbon adsorption technology. Further, the CA technology is capable of only marginally achieving 80 mg/liter consistently (IV-D-34). A second commenter agreed that adequate data on the control efficiency deterioration of CA units after a period of operation have not been collected (IV-D-29).

Response: As discussed in Appendix C (Sections C.3.1 and C.3.3) of BID, Volume I, two test days were omitted from the CA system technology evaluation because of abnormal system and terminal operations, as explained in the test reports.

In Test No. 1, the system was quite new, having been installed about 5 months before the test. The bed switching timer had been set to accommodate a low-volume lean stream (primarily fuel oil loading). During testing, a higher volume, rich stream was processed by the unit, due to increased gasoline business. This led to bed breakthrough on the first test day, and resulting high emissions of 92.6 mg/liter (II-D-41). Each time that loading started, the carbon unit switched to the same carbon bed regardless of whether the regeneration cycle had been completed. Since one carbon bed was repeatedly exposed to the inlet vapor stream without adequate regeneration, system performance on the first test day is not considered to represent the capability of this technology to control emissions. The timer was adjusted on the morning of the second test day, and emissions on the second and third test days were very low (8.5 mg/liter and 3.5 mg/liter, respectively). Emissions on the first two days of Test No. 3, performed at the same terminal as Test No. 1, were also very low (11.0 mg/liter and 9.7 mg/liter), indicating the ability of this system to maintain high collection efficiency after 17 months. The schedule at this terminal calls for staggered tank truck loadings, with half-hour intervals between loadings, and the CA unit had been sized to handle the resulting vapor loading (10,000 gallons in 15 minutes). On the third test day, the design capacity of the unit was intentionally exceeded by loading two trucks simultaneously. This produced the expected reduction in collection efficiency and increase in emissions (63.4 mg/liter). Thus, the third test day is not considered representative of system performance under normal conditions at this terminal, and the data were not used in assessing the performance capabilities of this technology.

Therefore, since the first occurrence of high emissions was due to a system maladjustment and the second occurrence was due to purposefully exceeding the design requirements in order to observe the results, these test results do not indicate performance of the CA technology under representative conditions and should not be included when evaluating the capability of this technology to meet a specified emission limit.

Any of the control technologies can be expected to undergo some degree of deterioration throughout their operating lives. As discussed in Section 2.6.3, this deterioration in control efficiency should be able to be controlled through regular adjustment, repair, and replacement of worn or broken components. As long as the critical operating parameters of a system are maintained within the recommended limits, control efficiency should be relatively consistent. In the case of CA units, these parameters include bed vacuum and adsorption cycle time, which depend on pumps, valves, and electrical components. Both vacuum and cycle time can be easily checked on a periodic basis to spot trouble areas.

The activated carbon itself has the potential to lose some of its working capacity through fouling or partial pulverization during bed repressurization. However, EPA is not aware of any total carbon replacements performed for these reasons in the five years since CA units were first commercially installed at bulk terminals. While the guarantee on the carbon from one unit manufacturer is 3 years (II-D-84, II-E-75), industry sources indicate that an assumption of a 10-year lifetime is reasonable (II-E-94, II-E-99, IV-E-29). For the purpose of costing potential carbon replacements, the 10-year period assumed in the original cost analysis (BID, Volume I) has been retained. Existing units have shown the ability to maintain the necessary working capacity over several years of operation.

Data from recent performance tests on newer CA units indicate that most units limit emissions initially to well below 35 mg/liter (see Table A-1 of Appendix A). Considerable deterioration would have to occur before the 35 mg/liter limit was exceeded.

Comment: Two commenters referred to the high level of collection system backpressure with CA units, which can lead to excessive vapor leakage from the system (IV-D-53, IV-F-1, IV-F-2, IV-F-4).

Response: As discussed in Section 2.6.2, recent test data did indicate some higher backpressures with CA systems. However, the data also indicated that a properly designed collection system in conjunction with CA systems could operate below the 450 mm of water limit specified in the regulation. It should be emphasized that the backpressure depends upon the design of the complete system, which includes not only the vapor processor but also vapor piping, valving, knockout tanks, and flame arrestors.

Comment: Two commenters discussed the phenomenon of aspiration in CA units. One claimed it is possible for TOC vapors to bypass control through aspiration of some vapors into the product being returned to the storage tank, and that this may be occurring in some systems. He recommended installation of an in-line sight glass in these systems to observe the returned product (IV-F-4, IV-D-53). The second commenter stated that such aspiration would not be possible, saying that vapor transfer by a centrifugal pump would constitute "extraordinary operation" (IV-D-36).

Response: The Agency recognizes the potential for circumvention of the standards by routing vapors around a control unit, but this practice has not been observed in any EPA tests. As discussed in Appendix C of BID, Volume I, an air balance analysis in Test No. 3 did not reveal any significant reduction in the air stream at the CA processor exhaust when compared to the processor inlet. It is considered highly unlikely that aspiration occurs, due to the capabilities of the centrifugal pumps which return liquid gasoline from the separator tank back to the storage tank. These pumps would not operate properly on a liquid stream containing an appreciable percentage of vapor (IV-D-15, IV-E-10).

Although the installation of in-line sight glasses may help to determine whether aspiration is occurring, EPA does not wish to make this a requirement of the standard. Based on technical and engineering considerations, it is highly unlikely that the aspiration described by the commenter occurs, and therefore, EPA feels that this would be an unnecessary requirement. As stated in Section 60.12 of the General Provisions, EPA does not allow circumvention of the standards by any means.

Comment: Three commenters referred to carbon bed temperature excursions at several CA unit installations during the summer of 1980. Due to the resulting extended shutdowns, one commenter felt that doubt had been cast on the ability of currently designed systems to consistently maintain high efficiency (IV-D-23, IV-D-53, IV-E-19, IV-F-1, IV-F-4). Another commenter pointed out that through the institution of certain design and operational measures, the overheating problem had been solved, with no units having problems since the original few incidents had occurred (IV-D-36).

Response: In conversations and correspondence with two carbon system manufacturers, a major supplier of activated carbon, and oil industry representatives, the apparent reasons for the incidents of carbon bed overheating were discussed (IV-D-36, IV-D-48, IV-D-49, IV-E-18, IV-E-19, IV-E-20, IV-E-29, IV-E-30, IV-E-40, IV-E-43). Six occurrences of carbon bed overheating were brought to the attention of EPA. These discussions indicated that the overheating incidents were primarily the result of improper flow distribution and improper startup procedures resulting in the insufficient preloading of the virgin carbon in some new, larger units. Precautionary measures to prevent overheating would include (1) complete conditioning of the virgin carbon to ensure that an adequate heel has been placed on the carbon to minimize subsequent high adsorption heat releases, and (2) sizing the unit to maintain proper vapor velocity and flow distribution through the carbon beds (IV-D-49).

In a report of a test program performed by one manufacturer (IV-D-49), it was determined that the carbon bed temperature excursions were due to oxidation reactions of some of the hydrocarbons in the gasoline vapors. In these tests, bed temperatures of 750°F were measured during a temperature excursion event. It was determined, however, that these reactions do not take place until the bed temperature has increased to a certain level. This threshold temperature where oxidation reactions begin to occur depends upon the type of carbon in the bed. Two types of carbon are used by the carbon system manufacturers, wood-based carbon and coal-based carbon. Onset of reactions in wood-based carbon occurs at bed temperatures around 250°F and in coal-based carbon at around 450°F. The report indicates that the conditions favoring temperature excursions include (1) large carbon beds which inhibit heat dissipation, (2) high ambient temperatures, (3) poor vapor distribution and/or low vapor velocities through the beds, (4) high concentrations of hydrocarbon vapor in the inlet air stream, and (5) long carbon bed adsorption periods without proper regeneration.

One manufacturer who uses wood-based carbon has now incorporated cooling coils in the carbon bed design to aid in heat dissipation (IV-D-49, IV-E-20). The cooling coils circulate the cool gasoline from storage which is already brought to the unit for the vapor absorption cycle. Another manufacturer considered using cooling coils but could not get them to perform to his satisfaction (IV-E-30). This manufacturer feels the problem can be eliminated by specifying coal-based carbon and carefully employing proper startup procedures for presaturating the carbon beds (IV-D-36, IV-E-30). Nevertheless, bed cooling options, using a water-glycol solution, are being offered on current units.

Industry representatives have addressed the carbon bed overheating issue by incorporating emergency shutdown measures and bed cooling devices on the new systems (IV-E-19). It appears that these measures could produce cost increases of up to $20,000 for carbon systems (up to 15 percent of unit cost). Two other oil industry representatives indicated that on any new carbon system ordered (and possibly retrofit to existing systems), they will specify cooling provisions and additional temperature sensors (IV-E-40, IV-E-43).

Since only six temperature excursion occurrences have been identified in the approximately 200 operating carbon systems, EPA does not believe that this is a widespread problem. EPA agrees with the manufacturers and with industry representatives that an effort should be made to carefully follow the recommended startup and operational procedures to minimize the conditions which may promote temperature excursions. Since one manufacturer of CA units now uses cooling coils in all new units, the cost of the cooling coils has already been incorporated into the new unit costs developed for CA units in Section 2.5.3 and Appendix B.

Comment: One commenter stated that there are still operating problems to be worked out with the CA systems (IV-D-19). Another commenter expressed concern that only the CA control technology has shown the potential to consistently achieve the 35 mg/liter standard, and that this technology is still in the developmental stages (IV-D-25).

Response: The first carbon adsorption system for bulk terminal vapor recovery was installed in November of 1976, and today the market is shared by two manufacturers with approximately 200 units in operation. Most types of vapor processors can be considered to be under development in the sense that continual design improvements are being made. Other technologies have shown the ability or the potential to meet the proposed standard. Test results on the TO system have consistently been below the 35 mg/liter limit. Several test results for REF systems have been below or near the standard limit and have indicated the potential for the system to meet the 35 mg/liter standard.

The first commenter did not specify any particular operating problems, but EPA is not at this time aware of any major operational problems with carbon adsorption systems. Previous difficulties which have occurred with CA systems have involved vacuum valve actuators and vacuum pump glycol seals (IV-D-37, IV-E-43). Currently, the terminal industry and equipment manufacturers are working to solve these equipment problems, and have made progress toward reducing the maintenance and repair needed by system components (IV-E-53).

Comment: Five commenters indicated that the CA system tests were performed on small units at small terminals, and do not represent even average size terminals. They felt that data on smaller systems may not indicate the performance of the large systems (IV-D-19, IV-D-26, IV-D-34, IV-D-53, IV-E-19, IV-F-1, IV-F-2, IV-F-3).

Response: As described in Section C.3 of BID, Volume I, EPA Test Nos. 1, 2, and 3 on CA systems were performed at two terminals having daily gasoline throughputs of approximately 200,000 and 300,000 liters (Model Plant 1). The other CA system referred to in Section C.1.3 of BID, Volume I, was sized to process 950,000 liters per day (Model Plant 2), although the daily average throughput is approximately 230,000 liters (II-D-149). Daily average emissions in these four tests were 2.7, 5.4, 1.8, 2.8, 3.9, 11.0, 9.7, and 12.0 mg/liter, respectively. More recent tests have been performed on CA units (Section 2.6.3) at terminals of various sizes. Table A-1 of Appendix A shows the results of these tests, including the volume of product loaded during each test. Emissions well below 35 mg/liter were measured throughout the size range of terminals which will be affected by the standards.

These commenters provided no supporting rationale or test data suggesting that the Agency's conclusions regarding the capabilities of the carbon adsorption control technology at larger terminals are inaccurate. Nor is EPA aware of process reasons that CA technology cannot achieve 35 mg/liter at such terminals.

2.6.8 Refrigeration (REF) Control Technology

Comment: One commenter felt that the proposed 35 mg/liter limit is too stringent for most control systems, including currently available REF systems. While REF systems can be designed to meet this limit, it may not be economically practical (IV-D-23). Another commenter stated that, based on experience with current REF units, the ability of such units to achieve a 35 mg/liter limit may depend on the time of year or time of day at which a unit is tested (IV-D-17). A third commenter stated that only one of his four REF units tested in California had demonstrated emissions below 35 mg/liter (IV-E-19).

Response: Some types of currently available vapor processors, most of which are designed to achieve an emission limitation of at least 80 mg/liter, may not be able to meet the 35 mg/liter emission limit. The emission limit of the proposed standards was selected to reflect the performance of the best control systems, which test data showed to be the CA and TO technologies. The most current refrigeration systems have generally been operated to meet the 80 mg/liter limit and have achieved 35 mg/liter in only some instances, with most units slightly above the 35 mg/liter limit. These units can be specified and operated to meet 35 mg/liter, at increased capital and operating costs over most current units, according to a principal manufacturer of REF units (II-E-74, II-E-85, IV-D-53, IV-E-3, IV-E-32, IV-F-1, IV-F-4). A recently completed EPA-sponsored program used a computer model to simulate a refrigeration vapor recovery system (IV-A-2). This computer model indicated that the 35 mg/liter limit is achievable by a refrigeration system cooling vapors to -100°F. Some systems currently operating in the field indicate condenser temperatures as low as -120°F (IV-B-4), which should allow a vapor temperature of -100°F to be achieved. The costs to purchase and operate REF units which will achieve the limit of the standard are affordable by the terminals which will be affected by the standards. Section 2.5.3 discusses the estimated costs associated with refrigeration units installed to meet the 35 mg/liter emission limit.

Current REF units may exhibit variable capabilities with respect to the 35 mg/liter limit, and the factors affecting system performance can include seasonal variations (weather and gasoline composition) as well as terminal loading schedules. However, as pointed out above, these systems in the field are sized and operated to comply with an 80 mg/liter limit. Recent tests on newer REF units indicate that an increasing number of units are controlling emissions below 35 mg/liter (IV-D-55, IV-E-38, IV-J-4). Thus, even though most current REF units are not operated to achieve 35 mg/liter, the Agency does not consider this technology invalidated for application under this regulation.

2.6.9 Thermal Oxidation (TO) Control Technology

Comment: Three commenters felt that the proposed emission limit encouraged the use of TO units, which do not recover any product, and this implied endorsement is inconsistent with the Nation's energy conservation policy (IV-D-23, IV-D-25, IV-D-26). Another commenter felt that only TO systems could consistently meet a 35 mg/liter standard (IV-D-34).

Response: Test data have indicated that CA and some REF systems can also meet the 35 mg/liter limit, so the TO system is not the only system considered under the standard. Furthermore, the cost analysis presented in Appendix B indicates that in most cases TO systems may not be cost-competitive with CA and REF systems when the value of recovered product is considered (see Section B.2.1). In addition to economic considerations, the trend toward larger terminals (consolidation as well as new construction) will tend to limit installations of TO systems, since product recovery cost credits make CA and REF systems more attractive at larger terminals (Tables B-1 and B-2).

An alternative approach to straight thermal oxidation involves a "hybrid" system composed of a compression-aftercooler stage, followed by a burner section. These systems achieve the high control efficiency of the thermal oxidation technique (99+ percent) while recovering some of the vapors displaced during loading (II-B-59, IV-J-5). The actual product recovery efficiency of these systems has not been evaluated.

2.6.10 General Control Technology

Comment: One commenter believed that most types of control units could achieve an 80 mg/liter limit, although some marginally. The commenter felt there would be problems with attempting to meet 80 mg/liter in areas without Stage I controls (IV-D-34).

Response: Much of the EPA testing of vapor processors performed to date has been in areas without Stage I controls, with most processors meeting the 80 mg/liter limit contained in SIP's. The best systems have the ability to achieve 35 mg/liter under various levels of inlet VOC concentration, from nonStage I levels (about 15 percent by volume) to Stage I levels (about 35 percent by volume) (see Sections 2.6.5 and 2.6.7).

Comment: Several commenters objected to the requirement in proposed §60.502(b), for a system design which would prevent vapor flow from one rack to another. These commenters interpreted this requirement as necessitating the installation of check valves in the vapor collection system. Reasons for opposition included: (a) the requirement constitutes an equipment standard, contrary to Section 111, (b) malfunctioning valves can cause excessive backpressure, leading to leakage, (c) all tank trucks should be vapor-tight, so the requirement is unnecessary, and (d) check valves are ineffective in low pressure drop vapor applications (IV-D-23, IV-D-25, IV-D-26, IV-E-19).

Response: Section 60.502(d) does not specify the use of check valves in the collection system, to avoid imposing a particular equipment standard. Rather, §60.502(d) requires that the system be designed in any manner adequate to prevent TOC vapors collected at one loading rack from passing to another loading rack. The requirement was included in the standard because of past observations of excessive vapor leakage from tank trucks which were connected to the collection system, but not loading product. This potential crossover of flow between racks is prevented in current systems observed during visits by EPA, generally through the use of check valves or similar devices (II-B-54, II-B-55, II-B-56, II-B-57, II-B-58, II-B-59, II-B-61, IV-B-6). In some cases all tank trucks are required to hook up to the terminal's vapor collection system, and since all tank trucks loading at a terminal may not be vapor-tight (such as dedicated diesel transports), tank truck vapor tightness alone cannot be relied on for vapor containment in the collection system. Also, losses due to vapors short-circuiting the system by escaping through open vapor recovery connectors at idle loading rack positions could be eliminated.

Malfunctioning valves can significantly increase backpressure at the tank truck. However, in recent terminal visits, terminal managers stated that the valves used in their vapor collection systems were not high maintenance items and did not malfunction often (IV-B-6). Also, since these valve devices have been used successfully in many of the terminals visited, EPA believes that they are effective in loading rack applications.

Comment: Two commenters questioned the need for the requirements in §60.502(h) and (i), which set limits on the gauge pressure in the delivery tank and on the opening pressure of the system P-V vents. One recommended a pressure limit of 7,000 pascals (700 mm of water) instead of the proposed 4,500 pascals (450 mm of water), to correspond to the design relieving pressure for tank trucks (IV-D-36). The other felt that these two sections of the regulation deal with engineering details and should be left to the design engineer working with performance specifications (IV-D-12).

Response: The pressure limit of 4,500 pascals corresponds to the pressure limit at which the tank trucks are tested using Method 27. Specifying a pressure of greater than 4,500 pascals would subject the tank to a pressure beyond the level at which it has proven to be vapor-tight and could possibly cause a leak. Department of Transportation requirements indicate that the relief vents are supposed to be full open at 7,000 pascals, but in fact the spring-loaded valves begin to open at a lower pressure. The 4,500 pascal limit is the maximum pressure level the tank relief vents have been found to sustain prior to beginning to open (II-A-41) and, therefore, was selected as the limit for testing tanks for pressure integrity.

There are many engineering details that must be considered in achieving this backpressure stipulation, such as pressure drop across the processor, pipe diameter, length of pipe run, and other flow restriction devices. All the engineering details to meet the 4,500 pascal limit are left to the system designers.

Comment: One commenter stated that, since a terminal's vapor collection system may receive vapors from sources other than loading racks, §60.502(b) should be revised to read:

> "Emissions from the gasoline loading racks shall not contribute more than 35 milligrams of VOC per liter of gasoline loaded to the bulk gasoline terminal's vapor collection system" (IV-D-12).

Response: The standards apply only to loading operations at bulk terminals. Section 60.502(b) and (c) limit emissions from the vapor collection system "due to the loading of liquid product into gasoline tank trucks." This wording is specific to the contribution from loading racks, and does not include, for example, storage tank emissions during product delivery. However, the terminal operator is free to route emissions from other sources if he so chooses.

2.7 SELECTION OF EMISSION LIMIT

2.7.1 Stringency of Emission Limit

Comment: One commenter stated that the proposed emission limit of 35 mg/liter appears to be overly stringent, since only carbon adsorption and thermal oxidation type processing units would be likely to meet the standard (IV-D-3). Another commenter felt that the proposed limit is unnecessarily stringent, and it would be "arbitrary and capricious" to impose the limit. The commenter felt that millions of dollars would be wasted due to the abandonment of RACT (80 mg/liter) controls already in place. An 80 mg/liter limit was recommended for the standards (IV-D-33).

Response: Standards of performance, in the form of numerical emission limits, are intended to reflect the degree of emission limitation achievable through application of the best adequately demonstrated technological system of continuous emission reduction, taking into consideration the cost of achieving such emission reduction, any nonair quality health and environmental impacts, and energy requirements.

As discussed in Sections 2.6.3 and 2.6.4, test data indicate that systems other than the CA and TO systems can meet the 35 mg/liter limit. Carbon adsorption vapor processors manufactured by both of the major suppliers have demonstrated the capability to regularly achieve emission levels below 35 mg/liter. Also, thermal oxidation units have shown the capability to achieve 35 mg/liter, although some TO systems may require a vapor holder to reliably achieve this limit. Compression-oxidation hybrid systems have been found to achieve the same high control efficiencies as the straight TO systems. In addition, test data and the manufacturer's claims suggest that REF systems can be designed and operated to meet 35 mg/liter.

Based on a number of emission tests, EPA has identified carbon adsorption and thermal oxidation as the best demonstrated technologies for controlling vapors from gasoline loading racks. Section 111 requires EPA to set numerical emission limits achievable through application of the best demonstrated technology (considering the statutory factors), even if by doing so the Agency precludes the use of less effective systems. Owners are nonetheless free to use any technology that will achieve the limit.

The third response in Section 2.3.1 discusses new regulation Section 60.502(c) which allows control systems already in place to continue meeting an 80 mg/liter standard. This will prevent the abandonment of current controls and will save the money referred to by the second commenter. However, the 35 mg/liter limit is reasonable and attainable for newly constructed facilities, for facilities without current controls which are voluntarily modified or reconstructed, and for facilities with refurbished vapor control systems.

2.7.2 Alternate Suggested Emission Limit

Comment: One commenter stated that mass emission rates from REF and CRA units vary with inlet temperature, humidity, and gasoline volatility. Thus, while refrigeration type systems would probably meet the proposed 35 mg/liter limit for most of the year, a limit of 55 mg/liter is more realistic and is achievable on a year-round basis (IV-D-17).

Response: No data to support the recommended 55 mg/liter standard were received from the commenter. EPA agrees that mass emission rates from many types of processors may vary with operating and environmental conditions. While CRA units have not shown the ability to consistently achieve 35 mg/liter under any of the conditions at which they were tested, REF units appear likely to achieve the limit under widely variable conditions (see Section 2.6.5). The major manufacturer of REF systems has stated that they can be specified and operated to achieve the 35 mg/liter limit (Section 2.6.8). Test data show that many of the most current REF unit installations are controlling emissions below 35 mg/liter (Section 2.6.8).

Nonetheless, test data show that best demonstrated technology, the basis for the standard of performance, consists of the carbon adsorption and thermal oxidation technologies, which are currently achieving the limit under the varying conditions mentioned by the commenter.

2.7.3 Efficiency Equivalent of Mass Standard

Comment: One commenter stated that an 80 mg/liter standard is nearly equivalent to a 95 percent efficiency standard, particularly in areas such as Southern California, where Stage I controls are in effect. Thus, the statement on page 3-22 of BID, Volume I, that the 80 mg/liter and 90 percent efficiency standards can be considered essentially equivalent, is not valid (IV-D-34).

Response: The efficiency which is equivalent to a particular mass emission rate depends on the inlet mass loading to the vapor processor. The inlet mass concentration is a variable quantity which depends on such factors as atmospheric conditions, the type of loading done at a terminal, and whether vapor balancing was performed prior to loading the tank truck. In vapor balance (Stage I) service, the Agency's estimated inlet loading of 960 mg/liter (II-A-9) would have to be controlled at (960-80)/960 = 91.7 percent in order for an 80 mg/liter standard to be met. The commenter's assumed control efficiency of

95 percent presumes an inlet loading of 80/(1-0.95) = 1,600 mg/liter, which is considerably higher than the values measured in tests. Since all control processors were evaluated on their ability to maintain outlet mass emissions within certain limits, the issue of control efficiency is not relevant to this particular standard. The Agency's rationale for selecting various emission factors is discussed in the response to similar comments contained in Section 2.4.2.

2.8 TEST METHODS AND MONITORING

EPA has been investigating alternative ways of reducing monitoring, recordkeeping, and reporting burdens on bulk terminal owners and operators. The goal is to reduce all recordkeeping and reporting that is not essential to ensuring the proper operation and maintenance of the control system. After reviewing the requirements in the proposal, EPA determined that monitoring and the compilation of monitoring data are essential for both the owner or operator and EPA to ensure proper operation and maintenance. The owner or operator of an affected facility would need monitoring information compiled in a usable form to determine when adjustments to the control system are needed to ensure that it is performing at its intended effectiveness level. EPA is therefore requiring only the additional step of filing the information in an accessible location. Because EPA judges that monitoring and recordkeeping are essential for proper operation and maintenance, these requirements have not been changed since proposal. It was judged, however, that reporting of terminal monitoring data is not essential to EPA. Therefore, the reporting requirements have been removed since proposal. In addition, when States are delegated the authority to enforce these standards, they may prefer either not to have reporting or to have reporting on a different schedule than EPA proposed. A State, however, is free at any time to impose its own reporting requirements in conjunction with this regulation.

At this time, no monitoring specifications have been developed to meet the requirements of the proposed §60.504. To avoid confusion, the monitoring requirements of §60.504 have been reserved and will be reproposed along with performance specifications at a later date in the Federal Register. Section 2.8.3 of this document has been included to respond, as much as possible at this time, to the comments received concerning the continuous monitoring section.

2.8.1 Details of Test Methods

Comment: One commenter felt that the details of test instrument calibration should not be specified in the test methods. A statement requiring all instruments used in the test to be appropriate for the intended use and calibrated according to applicable standards was suggested (IV-D-23).

Response: The calibration requirements of the test methods are the minimum required to assure accurate and precise data. As the data from the tests will be used to determine compliance of the control system, it is imperative that the test methods be completely definitive and repeatable. The specific calibration and test procedures of the methods for this regulation satisfy this need. As with all EPA methods, alternative measurement systems and calibration procedures may be used upon prior approval from the Administrator.

Comment: Two commenters addressed the calibration meters required in Method 2A. One stated that spirometers or wet test meters of sufficient size to calibrate large turbine meters are not readily available (IV-F-1). The other asked whether the calibration requirement of a spirometer or liquid displacement meter is consistent with the expected meter capacity which will be required for the tests, and what alternate references may be considered approvable by the Administrator (IV-D-39).

Response: Turbine meters used in previous Agency tests reported in the proposed standards were calibrated according to the procedures specified in Method 2A. Since that time, larger volume control devices have been installed or are in development that require much larger volume measurement devices. The commenters are correct that spirometers or other calibration meters of this capacity are not readily available. As an alternative, the Agency has revised Method 2A to include wind tunnel calibration against a standard pitot as an acceptable procedure for large volume gas meters.

Comment: One commenter recommended that turbine meters not be specified in the test methods for the measurement of the exhaust volume from chilled brine and cascade refrigeration systems. Tests have indicated discrepancies between measured and calculated volumes due to icing problems and an increase in lubricating oil viscosity due to very low stack exhaust temperatures (IV-D-17). Another commenter inquired why the applicability of Method 2A was limited to the temperature range of 0 to 50 degrees Celsius, and asked what alternatives were available if the temperature during testing were below 0 degrees (C) (IV-D-39).

Response: The applicable temperature range of Method 2A is specified to avoid the freezing and viscosity variability problems mentioned by the first commenter. If extremely low exhaust temperatures are encountered, one acceptable alternative procedure is to extend the stack or duct using duct material or hose so that the exhaust gas is warmed by the ambient air to a more acceptable level. Agency tests have shown the turbine meter to be applicable for measuring the exhaust of refrigeration systems, provided the proper precautions discussed above are taken toward preventing significant freezing or change in meter calibration.

Comment: One commenter felt that alternative methods to Method 2A should be allowed for measuring volume at the exhaust vent, since there are existing systems that are not readily adaptable to Method 2A measurements without substantial rework (IV-D-33).

Response: A total volume measurement method, as specified in Method 2A, is necessary for these sources because of the highly variable flow rates and the long test periods. The Agency is aware that some control devices have been installed which have reverse flow in the exhaust stack and/or large diameter stacks, both of which require modifications to the measurement systems. To date, adding adapters to existing exhaust stacks has proved satisfactory in allowing the use of total flow meters for these sources. In particular, for a control device with a larger diameter exhaust stack, the modification may include use of a reducing flange or a manifold system with multiple meters in parallel. For a control device with reverse flow in the exhaust stack, pressure-vacuum adapter valves and bypass plumbing may be used. These temporary testing adapters are practical, do not involve substantial rework, and have been used routinely in State compliance testing programs.

Comment: One commenter questioned why the calibration gas for test instruments was limited to propane or butane, and whether the balance gas (air, synthetic air, or N_2) made any difference in the calibration standards (IV-D-39).

Response: Section 60.503(c)(2) specifies use of either propane or butane as calibration gases as the carbon numbers for these gases correspond to the carbon numbers found for most emission gases. Additionally, these calibration gases are readily available, and National Bureau of Standards calibration gases for certification purposes are also available. The use of air or nitrogen as the balance gas should have no significant effect on the calibration values.

Comment: The same commenter suggested changing the definition of Calibration Drift in Section 2.5 of Method 25A to read:

> "The difference in the measurement system response to a mid-level value calibration gas before and after a stated period of operation during which no unscheduled maintenance, repair or adjustment took place" (IV-D-39).

Response: This change has been made to Method 25A to allow the determination of drift in the same range as the measurement.

Comment: This commenter also requested the reason why the sample probe sample hole size of 4 mm in diameter was specified in Section 3.2 of Method 25A (IV-D-39).

Response: Tests the Agency has conducted in the laboratory have shown that sample hole diameters of 4 mm or smaller are required for multihole rake-type probes to assure equal flows through all sample holes. This applies for sample flow rates of about 1 liter per minute or less, typically required for flame ionization detectors. Larger sample hole sizes may be required to deliver greater sample volumes.

Comment: Another commenter claimed that the statement in Section 4 of Method 25A, that the cylinder gas pressure for organic species is limited by the critical pressure of the organic material, is incorrect. Instead, the final pressure depends on the material's vapor pressure and its final concentration when pressurized. The same commenter stated that the utilization of stainless steel cylinders for storage of calibration gas mixtures, as referred to in the same section, is unnecessary, and increases the cost of such gases to the end user (IV-D-4).

Response: Revisions to Method 25A have been made to incorporate both of these comments.

Comment: One commenter recommeded that the effects of nonisothermal testing of tank trucks should be discussed in Section 4.3 of Method 27, instead of stating that delivery tanks should be protected from direct sunlight during testing. The following wording was suggested:

> "Every effort should be made to ensure that the test is conducted under isothermal conditions. The tanks should be allowed to equilibrate in the test environment. Tanks should be protected from extreme environmental variability, such as, direct sunlight."

This commenter further stated that, if the tank leaks, the pressure would never stabilize after closing the shutoff valve (IV-D-39).

Another commenter recommended that the specification requiring tank truck vapor tightness testing be limited to a performance specification to permit all acceptable methods. Alternatively, in addition to the specific gas pressure method, the commenter suggested that EPA approve and publish the submitted water test method as an alternate acceptable method. A detailed discussion and text of the water test method were submitted with this comment (IV-D-23).

Response: The first commenter is correct in stating that the purpose of protecting the tank from direct sunlight during testing is to minimize the effects of changing temperature. Method 27 has been revised to reflect this and to explain the importance of having stable conditions inside the tank prior to and during testing.

The commenter is further correct in that, if a large leak exists, the initial test pressure (in this case, 18 inches of water) cannot be maintained for more than an instant. However, if a small, slow leak exists, the pressure does not decrease quickly. Instead, the pressure may vary around the 18-inch level due to unstable conditions in the tank (as mentioned above), or due to lag time in the response of the pressure measurement device. Thus, the pressure inside the tank may require readjustment prior to testing in order to have a reliable steady initial pressure.

The "water test method" submitted by the second commenter is essentially equivalent to the procedure specified in Method 27. Revisions to Method 27 have been made to incorporate this alternative.

Comment: One commenter stated the concern that, due to a lag time of several minutes in the response of measuring instruments, the TOC concentrations recorded at the exhaust of the vapor processor during testing could be matched to the inappropriate volume measurements in the calculation of mass emissions (IV-F-1).

Response: A response time determination procedure has been added to Methods 25A and 25B and the regulation has been revised to direct the tester to correlate volume and concentration measurements accounting for the response time.

Comment: This commenter also asked whether the assumption in Section 1.1 of Method 2B, that the amount of auxiliary fuel used in gasoline vapor incinerators is negligible, is consistent with test data (IV-D-39).

Response: The auxiliary fuel for gasoline terminal incinerators is used only to ignite the pilot burner; it is not needed to sustain combustion of the gasoline vapors. At terminals tested by EPA, the amount of auxiliary fuel for the pilot is indeed negligible when compared to the large volumes of vapors processed. If there is a question as to the validity of this assumption at a particular terminal, one can refer to the terminal's records to compare the amount of auxiliary fuel used over several months relative to the gasoline throughput.

2.8.2 Methods of Testing

Comment: One commenter stated that the proposed visual inspection of the loading racks and vapor control system, means nothing with regard to vapor leaks (IV-D-12).

Response: The purpose of the requirement for a monthly inspection of the loading racks and vapor collection and processing systems is to ensure that the benefits of the control system are not lost due to large liquid or vapor leaks. While small vapor leaks may go undetected, larger leaks can generally be detected through sight, sound, or smell during an inspection. An inspection procedure involving the use of a combustible gas detector was considered for this requirement, but since the same results of finding and repairing large leaks could be accomplished using a method of sight, sound, or smell, the instrumentation approach was not selected. A particular terminal operator may decide to use improved methods to detect smaller leaks, and such procedures are not discouraged by the Agency.

The word "visual" in the inspection requirement in §60.502(j) of the regulation was deleted to clarify that the operator may use sight, hearing, or other means to detect large leaks.

Comment: One commenter suggested that, in order to determine whether a vapor recovery system was operating as guaranteed, EPA should strive to set a test basis which would evaluate each system in terms of its particular design criteria. The use of a vapor generator was recommended to produce design conditions for testing (IV-D-36).

Response: While a test basis that would evaluate a control system in terms of its particular design or guaranteed conditions may be required when the use of a specific control system is indicated, it is not appropriate in the case of a numerical emission limit, which may be met by whatever control system the owner or operator of an affected facility selects. Also, to implement the commenter's suggestion would require detailed knowledge of each control system that could be used to meet the standard. This would be impractical due to the variety of control systems now manufactured for controlling VOC emissions from bulk gasoline terminals and the continuing changes and improvements being made by the air pollution control vendors. Such a requirement is also unnecessary since the test methods and procedures specified in the regulation are adequate to be applied to any kind of control system that could meet the standard. Additionally, as required by §60.8(c) of the General Provisions, compliance with the numerical emission limit is determined by a performance test conducted during representative performance at the affected facility. The evaluation of specific control systems in terms of their particular design conditions, while not discouraged by the Agency, is left up to the individual vendors and purchasers of the control systems.

Comment: The same commenter expressed support for the proposed 6-hour performance test period, as long as the test period represents peak loading conditions. Since this commenter's carbon adsorption control units are designed around a 4-hour peak loading profile, it was felt that the 6-hour test performed during a period of peak loading activity should be a valid indicator of system performance (IV-D-36).

Response: While the performance test may or may not represent peak loading conditions, the test is to be run under conditions specified by the Administrator based on representative performance of the affected facility (40 CFR 60.8(c)). Additionally, to ensure that adequate data are obtained to constitute a valid performance test, a minimum gasoline throughput of 300,000 liters during the test is required in the regulation.

2.8.3 Continuous Monitoring

Comment: One commenter felt he saw a contradiction in two statements in the preamble to the proposed regulation. One statement says that extremely accurate measurements with monitors would not be required to determine exact outlet emissions; the other says that the average concentration or parameter value measured during the performance test would become the limit for the quarterly reports of excess emissions. The contradiction, according to the commenter, lies in basing excess emissions reports on numbers which are not precise (IV-D-29, IV-F-1).

Response: The records of the continuous monitors, kept on file at the terminal, should provide enforcement agencies with sufficient means of ensuring that the control devices are properly maintained and operated on a continuous basis.

The intent of monitoring is to identify control equipment whose operation and/or maintenance may be preventing the standard from being achieved. Records of monitoring results are not used to determine compliance with the numerical emission limit. According to 40 CFR 60.11(a), compliance with the standards of performance is to be determined only by performance tests, unless otherwise specified in the standard. Therefore, since the concentration or parameter value would not be used for a determination of compliance with the numerical emission limit, it is not important that the value be precise. Such information, however, can be used as an indicator of proper operation and maintenance of the control system when compared with the value of the same parameter obtained during the performance test.

EPA believes that changes in TOC concentration or parameters from those measured during a performance test are good indicators for an owner or operator to use to ensure good operation and maintenance and for an enforcement agency to use to determine whether an owner or operator is in violation of the §60.11(d) requirement to "maintain and operate any affected facility including associated air pollution control equipment in a manner consistent with good air pollution control practice for minimizing emissions." Periods of excursions or reductions of the measured value (depending on the control device) as determined by the continuous monitors may also indicate to an enforcement agency the need to conduct a performance test to determine compliance with the numerical emission limit.

Comment: Four commenters felt that reports of excess emissions should consist of periods when the numerical emission limit was actually indicated to have been exceeded. Two of them felt that, instead of the average value measured during the performance test, the VOC (now TOC) concentration necessary to cause the standard to be exceeded should be reported (IV-D-3, IV-D-20). Others agreed that such reports should indicate violations of the standard, but opposed the application of continuous monitoring and excess emissions reports to bulk terminals (IV-D-29, IV-D-32, IV-F-1). The fourth commenter pointed out that due to the expected degradation of units in service, most operators would be faced with the burden of filing excess emissions reports even on units which are operating within the standard (IV-D-26).

Response: As pointed out in the preamble to the proposed regulation, there are presently no demonstrated continuous monitoring systems commercially available which monitor vapor processor exhaust TOC emissions at bulk terminals in the units of the standard (mg/liter). If continuous monitors which reliably record emissions in units of the standard are developed, such monitors will likely be quite complex and expensive. EPA is investigating simple, low-cost continuous monitors which record exhaust TOC concentration and processor operating parameters (such as temperature recorders). Thus, data recorded by the available monitors do not permit a determination as to whether the numerical standard has been exceeded. Also, as discussed above, continuous monitoring records are not used to make determinations of compliance with the emission limit.

Comment: One commenter felt that a fixed outlet VOC concentration level could be set as a limit for the continuous monitor in REF systems, based on curves of vapor processor control efficiency under various inlet concentrations (IV-F-4).

Response: Since a format in terms of mass units (milligrams of TOC emitted per liter of gasoline loaded into tank trucks) has been selected, there is no single value of TOC concentration associated with the numerical emission limit. The mass emissions are calculated using both the TOC concentration and gas volume data collected during a performance test. Various types of vapor processors, all operating at the level of the standard, may exhaust different TOC concentrations. For example, carbon adsorption and thermal oxidation units operating at 35 mg/liter may emit lower concentrations than refrigeration units meeting 35 mg/liter, because the introduction of outside air into CA and TO systems increases the volumetric flow rate. Thus, the mass standard in mg/liter is composed of a range of TOC concentrations, depending on the flow rates through various processors. If a TOC concentration limit based on inlet concentration were set for REF systems, then the inlet concentration would have to be known in order to select the appropriate concentration limit. However, EPA testing at bulk terminals indicates that the TOC concentration returned from tank trucks is highly variable among regions, among terminals, and even among individual trucks in the same type of service at a particular terminal. Thus, it would be extremely difficult to assign a single inlet concentration to a given REF unit in order to determine the concentration limit for that processor.

Beyond the question of TOC concentration alone, however, several commenters seemed to have difficulty with the idea of using the "average value" of a measured parameter as the number of significance in determining "excess emissions." EPA recognizes that any reported values in excess of the average value recorded during a performance test do not necessarily indicate violations of the standard. Several commenters pointed out that normal equipment degradation over time may lead to a natural shift in the monitored value. The plant owners and operators have the option of repeating the performance test, thereby establishing a new monitoring value, if they feel some change has occurred to the control device and the numerical emission limit can still be met.

Comment: Several commenters questioned the advisability of continuous monitoring, one of them suggesting the alternative of frequent visual checks of operating parameters to determine proper system operation (IV-D-31). Another felt that a "monitoring-by-people" approach, supplemented by appropriate gauges and indicators, would assure that performance parameters of a processing unit would be observed and fine-tuned as necessary. This commenter took the position that no single instrument or group thereof is an appropriate mechanism for the requisite management of a vapor processing system (IV-E-19). Two other commenters felt that existing gauges supplied on some vapor processors should be considered for use as monitors of performance, instead of add-on instruments (IV-E-19). Also, the calculation of "average value" is extremely complex and beyond the capabilities of regular terminal personnel (IV-D-26). One commenter was concerned about the availability of adequate monitors and about the criteria used for monitor certification (IV-D-29), while a second commenter said that the type of monitors referred to in the proposed regulation have shown poor reliability in refinery applications in California (IV-D-19). Two commenters argued that personnel qualified to properly maintain monitors are not available at bulk terminals. The necessary instrumentation would require constant calibration and maintenance, and this would represent a significant manpower and cost burden, without compensating benefit (IV-D-25, IV-F-1).

Response: Discussions concerning the availability, reliability, complexity, maintenance, and cost of continuous monitoring systems are inappropriate at this time because monitoring specifications have not been finalized. EPA is investigating several types of monitors and developing monitoring specifications that are appropriate for application at bulk gasoline terminals. In selecting these specifications, EPA will consider the reliability and usefulness of these monitors as well as the cost and difficulty of maintaining them. After the specifications have been selected, they will be proposed in a separate action in the Federal Register for public comment. Section 60.504, Monitoring of Operations, has been reserved at this time, so that monitoring requirements and performance specifications can be added at a later date.

Continuous monitoring of the performance of bulk terminal vapor processors is considered essential to help ensure that the standard is being achieved on a continuous basis. Many of the alternate methods suggested by commenters for accomplishing this end have a great deal of merit as supplemental measures. Frequent visual checks are already being performed at most controlled terminals (many of them record operating parameters on daily logs), and this practice is encouraged. However, such checks are generally performed only once per day, and often at times when the processor does not happen to be operating, such as when tank trucks are not loading. The parameters recorded may not indicate system performance, for example, during peak loading periods, when its performance is most critical. Therefore, visual checks should be considered an important, but supplemental, means of tracking a system's operation. The commenter suggesting a "monitoring-by-people" approach advocates a weekly checklist similar to the one described above, and a subsequent comparison of parameter values with the ranges suggested by the manufacturer (IV-E-12). Again, such periodic checks would be useful in terms of proper maintenance of the system, but may be too limited to provide sufficient information about the system's likely emission level. Continuous monitoring instruments cannot by themselves lead to the proper operation and management of a vapor processor. However, data from several properly selected instruments is believed to be the best means of monitoring processor performance over a period of time. More detailed information, such as that collected on checklists, should be used by the terminal in its maintenance program.

EPA acknowledges that exhaust TOC concentration is only one of several parameters of operation which influence the amount of TOC emitted from a control device. Ideally, a terminal owner or operator would monitor all parameters which influence emissions and then enter values for these parameters into a formula in order to calculate emissions. However, it would be burdensome for the owner or operator to be required to collect this much data and perform such calculations on a continuous basis. At a bulk terminal there are too many parameters which are necessary to calculate mass emissions for continuous monitoring of all of them (using simple, currently available monitors) to be practical. Therefore, a form of monitoring which indicates whether the control unit is being properly operated and maintained is considered an effective means of minimizing emissions over an extended period. EPA believes that in most cases the best way to demonstrate proper operation and maintenance is to monitor only one parameter which directly influences the actual emission rate from the processor.

As stated in the preamble to the proposed standards, it is possible that monitoring systems included with a processor may be substituted for an add-on system, with the approval of the Administrator. Many processors currently being installed have parameter monitors which may be suitable for this purpose. Some unit manufacturers are developing more sophisticated monitoring packages for use with their equipment (IV-D-36, IV-D-53).

Comment: One commenter indicated that proposed Section 60.500(c), which states that the provisions for monitoring of operations will not apply until performance specifications are promulgated, makes it very difficult (for a terminal owner or operator) to apply effective budget and planning principles (IV-D-12). Several other commenters objected to the inclusion of pending provisions for monitoring in the proposed regulation. One recommended that such provisions not be included until a system which would not be capital-intensive, operationally complex, or require excessive maintenance has been developed (IV-E-19).

Response: By including the general requirements for monitoring systems in the standards at the time of proposal, the Agency intended to make planning and budgeting more straightforward for owners and operators. However, because the monitoring specifications are not available at promulgation, the continuous monitoring section of the standards has been reserved. The monitoring requirements and specifications will be proposed in the Federal Register at a later date and comments will be requested at that time.

2.9 TANK TRUCK CONTROLS

Approximately 20 commenters objected to the mechanism for assuring that loadings of gasoline tank trucks be restricted to vapor-tight vehicles. These comments are summarized in the following sections.

2.9.1 Restricting Loadings to Vapor-Tight Trucks

Comment: Several commenters felt that the terminal owner or operator should not have any responsibility for the vapor-tight status of for-hire tank trucks. It was felt that the terminal operator should not be required to police the testing and use of tank trucks which are owned by others. A common carrier would be free to send an unauthorized tank truck to an unattended terminal, without the knowledge of the terminal operator, and the ensuing liability of the terminal operator would be inappropriate (IV-D-1, IV-D-9, IV-D-10, IV-D-12, IV-D-13, IV-D-20, IV-D-24, IV-D-26, IV-D-27, IV-D-28, IV-D-29, IV-D-30, IV-D-32, IV-D-33, IV-D-37, IV-E-19, IV-F-1, IV-F-2, IV-F-3, IV-F-6). Furthermore, several commenters felt that requiring the terminal operator to restrict loadings to vapor-tight trucks would require manning the terminal 24 hours per day. It was felt that this would impede the trend toward more efficient, automated terminals (IV-D-9, IV-D-24, IV-D-25, IV-D-26, IV-D-27, IV-D-28, IV-D-32, IV-D-33, IV-D-35, IV-D-41, IV-E-19).

Response: Fugitive VOC emissions from tank trucks which occur during loading can be a significant emission source. It is estimated that on the average, nonvapor-tight tanks lose an average of 30 percent of the potential vapor transferred, through leaks in dome covers and pressure-vacuum vents. By requiring the tanks which handle gasoline to pass an annual vapor tightness test, the average vapor loss due to leakage during the year between tests can be reduced to about 10 percent of the potential vapors transferred (II-I-69). Oil industry representatives also have agreed that fugitive losses from tank trucks can be a significant problem and should be controlled (IV-E-19, IV-F-3). Fugitive VOC losses from tank trucks not only increase the pollution problem but decrease the amount of liquid that can be recovered in vapor recovery equipment. The terminal owner or operator could lose as much as $2 in recovered product per loading into nonvapor-tight trucks. For a small 380,000 liter/day (100,000 gallon/day) terminal this could represent a daily loss of over $25. For a large 3,800,000 liter/day (1,000,000 gallon/day) terminal the losses could be over $250/day.

To reflect the best demonstrated technology in controlling tank truck leakage, the standards require that the loading of product into gasoline tank trucks be into vapor-tight tanks only. A vapor-tight tank is defined as one that has passed a vapor tightness test within the preceding year. EPA Method 27 outlines the annual vapor tightness test. This test would reduce average fugitive VOC losses from tank trucks by 67 percent (from 30 percent to 10 percent average vapor loss).

The objections from the terminal industry arise concerning the responsibility for assuring loadings are into vapor-tight tanks. The industry feels the responsibility should be on the tank truck operator instead of the terminal operator. However, for the responsibility under NSPS to be on the tank truck operator, the tank truck would have to be part of the affected facility. As discussed in BID, Volume I and the preamble to the proposed standards, the feasibility of including the tank truck in the affected facility was reviewed. The first case considered both the tank truck and the terminal as separate affected facilities under the standards. This would lead to difficulties associated with enforcing two standards governing a single polluting operation. For example, provisions would have to be made for the problem of NSPS applicability when an existing tank was loaded at a new terminal. The second case considered the truck tank and the terminal as a single affected facility under one standard. Again, it would be unreasonable to attempt to regulate a hybrid and changeable affected facility that would exist only during a loading operation and would frequently have more than one owner. It was felt, therefore, that the best approach to controlling fugitive tank truck leakage was by applying NSPS controls only to bulk terminals, and permitting NSPS-covered terminals to load only into truck-mounted tanks that have passed a vapor tightness test. Since tank trucks load primarily with equipment owned by the terminal owner, and on the property of the terminal owner, EPA believes it is reasonable to presume for the purpose of this regulation that these owners can exercise sufficient control over the source to justify making them responsible for the emissions therefrom.

As stated in the preamble to the proposed regulation, it was not intended that terminal personnel should man the racks 24 hours per day, or observe the loading of every tank truck to verify that each truck had passed an annual vapor tightness test. EPA felt that requiring documentation on file that gasoline tank trucks operating out of the terminal had passed a vapor tightness test would provide a sufficient means of promoting loadings into vapor-tight tanks. Industry opposition is centered around the liability placed on the terminal owner for trucks he does not own. At unmanned, automated terminals, the terminal operator is usually not present and cannot determine which trucks are loading. EPA realizes these limitations but believes that the vapor tightness requirement is necessary for the standards to be effective.

Changes to the vapor tightness requirement have been incorporated into the promulgated regulation to clarify that the standards do not require the terminal operator to man the racks on a 24-hour basis. At terminals, even automated computer-billed terminals, some hard copy manifest is given to the driver of a for-hire tank truck to verify the date and the type and amount of product loaded. The driver keeps this copy for his own records and often a copy is returned to the terminal to cross-check the computer billing. In several cases it has been observed that the truck or tank identification number is logged on this hard copy manifest (IV-B-6). These records are used for billing purposes and would allow the terminal owner to identify the truck driver if he desired to do so in the future. The Agency has incorporated into the final regulation a requirement that the terminal owner obtain the tank identification number of all gasoline tank trucks operating at affected facilities. The owner is further required to periodically cross-check the tank identification with the vapor tightness documentation on file at the terminal. This cross-checking is required within 2 weeks of the loading. Since the identification numbers would be supplied to the terminal by the tank truck company, and the tank truck company would be identified on the billing manifest at the time of loading, cross-checking of identification numbers should be rapid and should not represent an excessive burden on the terminal operator.

If the terminal discovers that an unauthorized tank truck has received gasoline, the terminal operator is required to notify the tank owner, indicating that only vapor-tight trucks may load gasoline at the NSPS-covered terminal. This notification would have to be documented and kept on file at the terminal. The terminal operator would then have to take steps to assure that the unauthorized tank truck does not reload at the terminal until the required vapor tightness documentation had been provided. Methods available to the terminal owner or operator for achieving this could include revocation of loading privileges, or contractual agreements between the terminal owner or operator and the truck owner or operator. However, the regulation does not specify any particular methods, to allow the terminal owner or operator the flexibility to meet the requirements with minimum disruption to the terminal operations. As specified in Section 111(h)(3) of the Clean Air Act, the regulation provides that if the terminal owner, after notice and opportunity for public hearing, "establishes to the satisfaction of the Administrator that an alternative means of emission limitation will achieve a reduction in emissions ... at least equivalent to the reduction in emissions of such air pollutant" achieved under these vapor-tight tank truck requirements, the Administrator "shall permit the use of such alternatives ...." Thus, the terminal owner is free, with EPA approval under Section 111(h)(3), to develop a different strategy for controlling such fugitive emissions.

Comment: Two commenters stated that access cards at automated terminals are not issued for a specific vehicle, so that loadings of particular delivery tanks could not be monitored (IV-D-24, IV-D-29, IV-E-19).

Response: EPA realizes that the access cards at these terminals are not issued by vehicle, but are issued by company and by driver. However, the method for limiting loadings to vapor-tight trucks does not require on-the-spot monitoring or lock-out by the computer access equipment. All that is required is that the terminal operator obtain the tank identification number of each truck loading at the facility on a particular day. Cross-checking against the vapor tightness data on file could be done at a time more convenient to the terminal operator.

2.9.2 Suggested Alternatives

Several commenters suggested alternatives to the section of the regulation dealing with tank trucks, either in the wording of the regulation or an alternate approach. These alternatives are discussed in this section.

Comment: One commenter felt that the owner of an affected facility should be required to "clearly advise" tank truck operators of the requirements, with actual responsibility for compliance on the operators of the trucks (IV-D-1).

Response: EPA agrees that as a terminal becomes affected by the regulation, the owner or operator of the facility should notify those tank truck firms that operate out of that facility of the requirements for vapor recovery equipment and vapor tightness. The terminal owner or operator would have to notify tank truck owners in order to comply with the requirement under §60.502(e)(1) to obtain vapor tightness documentation. Therefore, a separate requirement for terminal owners to advise truck operators of the terminal's equipment and operational requirements is not considered necessary. Operators of the trucks cannot be made responsible for compliance, since the tank truck is not part of the affected facility. Truck operators will, however, have to install the proper equipment and have their trucks tested for vapor tightness, in order to load at any affected terminal. Reasons for not including the tank truck in the affected facility were discussed in Section 2.9.1.

Comment: Another commenter suggested a system of vehicle inspection stickers to enforce the vapor tightness provisions (IV-F-1, IV-F-2).

Response: It is possible that the use of stickers may expedite the day-to-day, spot checking of tanks for vapor tightness, as shown in the system used in California. However, since this type of checking may impose an unreasonable burden on the terminal operator, and is impractical at unattended terminal operations, it has not been made a part of the regulation. EPA feels that the system of obtaining tank identification numbers and cross-checking against vapor tightness documentation will accomplish the objective of limiting tank truck fugitive VOC emissions during loading.

Comment: Another commenter felt that it was reasonable to require the owner or operator to request written documentation of vapor tightness, but that he should not be held responsible for the completeness or accuracy of the documentation (IV-F-1, IV-F-3).

Response: The intent of keeping the vapor tightness documentation on file at the terminal is not to require the terminal operator to observe the tests or verify the test results for those trucks he does not own. In the regulation, §60.505(b) describes the minimum information that the terminal operator should accept as documentation that a tank truck has passed the vapor tightness test.

Comment: One commenter suggested revisions to proposed Sections 60.502(d), (e), and (f) of the regulation, which would require the terminal owner or operator to "implement a program designed to" restrict loadings to vapor-tight tank trucks with compatible vapor recovery equipment, and require connection of the truck's and the terminal's collection systems during each loading (IV-D-10).

Response: Allowing the terminal operator to simply "implement a program" to restrict loadings to vapor-tight trucks would require that the Administrator review all programs on a case-by-case basis to determine adequacy. Under this approach, no guidelines for an acceptable program would be available to the owner or operator. Changes made to the regulation represent a program which is reasonable, but which still allows the terminal to use any method which EPA judges equivalent under the terms of Section 111(h)(3), as described in Section 2.9.1 of this document. This will permit flexibility in complying with these requirements while reducing the case-by-case determinations necessary by the Administrator.

Comment: One commenter stated that the independent tank truck operator would be restricted in his business because his access to regulated terminals would be limited, and he could not operate at various terminals because they would not have vapor tightness documentation for his tank trucks on file at the terminal. The commenter proposed as an alternate scheme that tank truck operators carry the documentation and be responsible for connecting vapor collection equipment during loading. Terminal operators would only have to train drivers in the hookup procedures (IV-D-9).

Response: Having the tank truck operator carry the documentation as the only means of vapor tightness verification would require the terminal operator to review the information before each loading. This would be impossible at unmanned automated terminals, and such a requirement would be a burden on both the terminal and truck operators. At most terminals, the truck driver performs all the loadings at the racks and is responsible for performing these operations within the operating rules of the terminal, with terminal operators training drivers in the loading procedures.

Tank truck owners can alleviate any possible restriction on the number of terminals at which their trucks may load by sending documentation to all affected terminals at which their trucks might conceivably load in the coming year. For manned terminals, this documentation could be provided at the initial loading at each individual terminal. This one-time filing of information would be much more practical than having to present documentation at each loading.

Comment: Another commenter felt that the regulation should make clear that a terminal owner or operator would not be required to test for-hire tank trucks for compliance, nor to keep documentation on such trucks at the terminal. He suggested the following revised Section 60.505(a):

> "The owner or operator of each bulk gasoline terminal, prior to loading gasoline into a tank truck, shall request the tank truck driver to provide a certificate indicating the tank truck meets all EPA requirements and testing to qualify as a vapor-tight gasoline tank truck" (IV-D-13).

Response: As indicated in the response to the previous comment, a requirement for the tank truck driver to present vapor tightness documentation before each loading would necessitate that the terminal be manned at all times. This would not be feasible at the state-of-the-art automated terminals. By requiring that the driver record the tank I.D. number at the time of loading, the terminal operator can verify the vapor-tight truck loadings at a time when the terminal office is manned. As currently phrased, the regulation makes clear that the terminal operator is not required to test trucks for compliance, but only to keep documentation on file, record tank truck identification numbers, cross-check identification numbers, and make the specified notifications (§§60.502(e) and 60.505(a)).

Comment: One commenter felt that an extensive file would have to be checked to verify each tank truck's status before each product loading. A suggested alternate approach is to require the owner of each fleet or truck which may use an affected terminal to file an annual certification that all trucks used have been proved vapor-tight, with this file being maintained only at the central office which controls each terminal complex (IV-D-23).

Response: The intent of the proposed regulation was not to require that the data file be checked prior to each loading. The final regulation requires the vapor tightness documentation to be obtained from the truck owner or operator and to be kept on file at the terminal. It is possible that in some cases a terminal operator may be permitted to keep the documentation file at a location other than the affected terminal, especially in the case of unmanned terminals. This file will be checked against the tank identification numbers recorded for tank truck loadings within a time limit of 2 weeks. The commenter's alternative would be impractical, since the terminal owner would be unable to verify whether only the vapor-tight trucks operated by a particular firm are loading at the affected facility.

Comment: One commenter offered the suggestion that State regulations would be the best vehicle for enforcement of tank vapor tightness, and stated that enforcement penalties on truck operators in California lead to an effective system in that State (IV-F-1, IV-F-3). Two commenters felt that in areas with no SIP coverage, the controls on tank trucks would not be effective, because of the variety of schedules and equipment in those areas. Both agreed that many truck drivers might be inclined to circumvent the requirements if there were no direct penalties, and that SIP regulation would be a more effective means of control than NSPS (IV-F-1).

Response: Section 111 requires that NSPS reflect application of best demonstrated technology for new, modified, and reconstructed terminals in both attainment and nonattainment areas. The Agency has determined that the CTG vapor tightness requirements reflect application of such technology to tank trucks. Therefore, this NSPS extends the CTG level of control to affected facilities in attainment areas that may not be controlled by the States, thereby ensuring control to minimum national levels at all new, modified, and reconstructed facilities. The various schedules of tank truck deliveries in nonSIP areas should not affect the effectiveness of vapor tightness controls in these areas. Once a tank truck owner had installed vapor collection equipment and tested a tank truck for vapor tightness, he would be free to follow any delivery schedule compatible with local business patterns with no disruption resulting from the standards. The tank truck's equipment would have to be compatible with the terminal's, as in all instances, so that loading and vapor recovery could be accomplished. Such equipment requirements are not unusual, and would be similar to the requirements on tank trucks loading at terminals in SIP-controlled areas.

As stated before, since the tank truck is not part of the affected facility, the regulation can directly apply only to the terminal. EPA believes that adherence to the logging and notification method of compliance specified in the regulation will reduce the level of gasoline loadings into nonvapor-tight trucks.

Comment: One commenter proposed an alternative to the tank vapor tightness program, in which a fan would be installed in the vapor collection system to draw air-vapor mixture out of the tank trucks during product loading. This would make tank vapor tightness unnecessary, because large positive pressures, causing leakage, would not be created in the tank (IV-C-9, IV-F-1).

Response: EPA did not select the commenter's proposed alternative to the tank truck vapor tightness requirement since no system of this type has been installed or demonstrated at a commercial bulk gasoline terminal.

Comment: Another commenter suggested an alternative which would require that the owner or operator of the terminal maintain files documenting gasoline tank trucks that are authorized to load at that facility, and that gasoline tank truck owners or operators not load unauthorized or incompatibly equipped gasoline tank trucks at the facility. The documentation file could include a contractual requirement that the gasoline tank truck owner would not present for loading any unauthorized or incompatible units. Violations of the contract could subject the owner to revocation of the provisions of the contract, such as loss of loading privileges for his gasoline fleet (IV-D-24, IV-D-41).

Response: EPA does not choose to specify requirements for or restrict any contractual agreement between the tank truck operator and the terminal operator. However, enforcement of contractual provisions between the terminal and tank truck operators may be an effective method of assuring that the terminal operator obtains the correct tank truck identification numbers and prevents a nonvapor-tight truck from loading a second time. Also, contract enforcement may form part of a compliance strategy different from that specified in the standards. As discussed in Section 2.9.1 above, terminal owners may use methods of compliance different from that specified by EPA if, after notice and opportunity for public hearing, the Administrator determines that the alternative method would result in emission reduction at least equivalent to that resulting from adherence to the compliance method specified in the regulation. The Administrator must review and determine the equivalency of any alternative approaches on a case-by-case basis, in accordance with Section 111(h)(3) of the Clean Air Act.

2.9.3 Administrative Burden

Comment: One commenter felt that an administrative burden would be created by a requirement to keep vapor tightness documentation for as many as 400 to 500 transport trucks using a given terminal (IV-F-1, IV-F-2). Several other commenters generally argued that the tank truck controls would represent an administrative burden, as well as being costly and inequitable (IV-D-12, IV-D-27, IV-E-19).

Response: The testing and maintenance of tank trucks for vapor tightness has been shown to have a significant effect in reducing total emissions during loading (Section 2.9.1). Thus, this procedure has a very important function in bulk terminal VOC emissions limitation. The administrative burden of keeping the documentation on file would be minimal since the information would in most cases be supplied by the owner of for-hire tank trucks and the terminal would simply file the data. As discussed in Section 2.9.1, cross-checking these files with tank identification numbers logged during loading should be a simple process and should not represent an excessive burden.

2.9.4 Tank Truck Population Impacted By The Standard

Comment: One commenter said that the total population of tank semi-trailers in gasoline service had been seriously underestimated in BID, Volume I, and hence the economic impact of controls on the tank truck industry had not been fully considered. He further stated that for-hire or common carriers cannot dedicate particular tank trucks to particular terminals so that regulatory coverage of a terminal could impact all common carriers in the same area (IV-F-4, IV-F-6).

Response: The economic impact on the for-hire tank truck industry is performed on an individual firm basis rather than a nationwide basis. Only tank trucks in attainment areas will be impacted by the standards since the tank truck requirements are identical to SIP requirements being implemented in nonattainment areas. Since the standards affect only about 7 percent of all terminals in attainment areas, it seems very unlikely that all tank trucks in attainment areas would be affected. Or, looking at it in another way, it seems unlikely that, if a trucking firm operated out of 100 terminals, it would convert all trucks to the NSPS requirements if only 7 of these terminals became affected facilities. However, for purposes of the economic impact analysis to determine if these individual trucking firms could afford the NSPS requirements, the following assumptions were made: (1) for trucking firms in the smallest two firm sizes (operating 2 tank vehicles and 7 tank vehicles, respectively), it was assumed that all tank vehicles would be converted to meet the NSPS requirements, and (2) for trucking firms in the two largest firm sizes (operating 30 tank vehicles and 100 tank vehicles, respectively), it was assumed that 50 percent of the tank vehicles would be converted to meet the NSPS requirements. EPA believes these assumptions are realistic in determining the worst case economic impact on each model firm. As discussed in Section 8.4.2 of BID, Volume I, the economic analysis using these worst case assumptions showed a small impact on the for-hire tank truck industry.

Many attempts have been made by several organizations to estimate the total national tank truck population. An analysis by the Tank Trailer Manufacturer Association (TTMA) in 1979 concluded that there are about 80,000 liquid petroleum tank trailers in service. The analysis indicated that government and industry estimates at that time ranged from 70,000 to 132,000. The estimate of 100,000 tank vehicles in flammable liquid service made in Section 8.1.3.2 of BID, Volume I is still considered a reasonable figure, in light of the unavailability of exact population data. The estimate of 85,000 gasoline tank vehicles taken from an EPA survey is considered conservative, considering the variety of petroleum products which are not normally transported in gasoline tank trucks. The commenter does not explain his contention that "it is safe to assume that virtually every one of those (petroleum service) trailers finds its way into gasoline service at one time or another." EPA does not agree with this assumption.

As stated in the Arthur D. Little (ADL) report (II-A-47), tank wagons (at bulk plants) usually have tank capacities between 2,000 and 4,000 gallons, whereas transports (at bulk terminals) usually have capacities between 8,000 and 9,000 gallons. Bureau of the Census data were used to estimate the percentage of liquid tank vehicles having a capacity greater than 4,000 gallons (15,140 liters). This percentage was found to be 31 percent, indicating that there are approximately 26,300 gasoline tank trucks in operation at bulk terminals. This is consistent with the ADL statement that, in 1978, there were an estimated 29,200 gasoline tank trailers in operation at bulk terminals. The 45,000 semi-trailers which the commenter says are operated by National Oil Jobbers Council (NOJC) members transport all petroleum products between all marketing distribution points.

The percentage of the 26,300 bulk terminal tank trucks which will require conversion to bottom loading or vapor recovery as a result of the standards can only be estimated roughly. The tank trucks in nonattainment areas, approximately 72 percent of the total, or 18,900, are expected to be regulated under SIP's. This leaves about 7,400 tank trucks potentially eligible for retrofit under the standards (in attainment areas). The percentage of affected existing facilities in these areas by 1986 is expected to be 7.1 percent, so that approximately 525 tank trucks will be affected in the first 5 years. Assuming the number of terminal-owned tank trucks at each model plant as shown in

Table 6-2 of BID, Volume I, the remaining number of for-hire trucks would be 370, or 70 percent of the total. This is consistent with the ADL statement that most gasoline transports are owned by common carriers and not by terminal operators. Thus, the total number of for-hire gasoline tank trucks operating at bulk terminals can be estimated to be 70 percent of 26,300, or 18,400, and the number of affected for-hire trucks would be about 2 percent of this total.

While many more tank trucks are likely to be retrofitted for bottom loading during the first 5 years, these conversions will be performed for reasons of safety, modernization, and fleet utilization flexibility. In addition, State vapor recovery regulations in most areas will tend to encourage bottom-loaded, vapor recovery-equipped tank trucks to become the industry standard.

2.9.5 Economic Burden

Comment: One commenter felt that the impact on oil jobbers, who would be indirectly affected because loadings of gasoline tank trucks would be restricted to those which had passed an annual vapor tightness test, would be minimal. The commenter also stated that the costs associated with this test would not be excessive (IV-D-8).

Response: EPA has examined the costs of the vapor tightness test and found them to be reasonable. The analyses in Section 2.5 and Appendix B support this comment.

Comment: One commenter pointed out that tank trucks would require adapters in order to load at several terminals having different vapor recovery systems. In this situation the independent for-hire truck operator could not be competitive with trucking companies operating with larger fleets of trucks. This commenter also assumed that any gasoline tank truck loading at an affected facility would deliver only to those service stations or bulk plants with vapor control systems. The commenter questioned what the requirements on tank trucks would be for those which loaded alternately between affected and unaffected facilities. This commenter further questioned whether tank trucks would be required to install overfill protection. It was suggested that further studies on the for-hire motor carriers be initiated, which should include additional data obtained from State associations and their members, and should verify the accuracy of 1977 data relative to today's market situation (IV-D-11).

Response: An economic analysis was performed for each model tank truck firm size and the results were presented in BID, Volume I. The analysis indicated only a minor economic impact on the smaller independent for-hire truck firms. The regulation will apply only to the loading of gasoline tank trucks at new, modified, or reconstructed bulk gasoline terminals. The NSPS does not apply to tank truck unloading or loading operations at bulk plants or unloading operations at service stations, nor do the standards specifically require overfill protection. However, the tank truck operator would have to comply, as at any terminal, with the loading requirements of that individual terminal. If a terminal requires overfill protection, as most bottom-loading terminals do, then the tank truck operator would have to install overfill protection in order to load at that terminal.

Since independent trucking firms are able to operate in SIP-controlled areas where the same types of adapters would be required for loading and vapor recovery systems, EPA does not feel that the requirement for adapters is an excessive burden on the independent tank truck operator. Since the independent typically operates out of several terminals with a variety of equipment and procedures, the need for several adapters should not be unusually burdensome for these truck owners. Oil company representatives have informed EPA that common carriers do not require a large assortment of adapters to load product, because such equipment is manufactured according to the specifications of the American Petroleum Institute (API) (IV-E-19, VI-J-21).

As stated in previous responses, the control of fugitive leakage emissions from tank trucks is very important to achieving meaningful reductions in bulk terminal overall emissions. A typical leaking truck may lose 30 percent of its displaced vapors through worn or defective equipment, or 288 mg/liter in fugitive losses. This amounts to over eight times the emissions from a state-of-the-art vapor processor. Considering the importance of controlling these emissions, EPA believes it is reasonable to set standards that effectively require independent tank truck owners that typically service a variety of terminals to load only into vapor-tight trucks at NSPS-covered facilities.

Additional data gathering and consideration of costs to the for-hire tank truck industry have been undertaken since proposal. The cost and economic impacts are discussed in Sections 2.5.5 and 2.5.6, and in Sections B.2.2 and B.3 of Appendix B.

2.10 LEGAL CONSIDERATIONS

2.10.1 Tank Trucks Not Stationary Sources

Comment: Several commenters questioned EPA's legal authority to impose restrictions, i.e., retrofitting and vapor tightness testing, on gasoline tank trucks. Two of the commenters felt that, since tank trucks do not fall within the definition of a "stationary" source, they may not be regulated under Section 111 (IV-D-20, IV-D-35, IV-F-4, IV-F-6). One commenter expressed the opinion that tank trucks are neither "major" nor "stationary" sources, and that the proposed controls on tank trucks constitute ultra vires requirements. These requirements were characterized as "arbitrary and capricious," and said to constitute "the taking of private property without cause, compensation, or due process" (IV-D-33). Another commenter stated that the proposed standard usurps State regulatory functions by imposing an extra layer of Federal regulation on top of effective State rules, and by "artificially" treating tank trucks as stationary sources subject to the standards (IV-D-26).

One commenter stated that EPA has no authority to promulgate NSPS which control emissions from mobile sources directly or indirectly. He does feel, however, that it is reasonable to require a terminal owner or operator to request written vapor tightness verification from tank truck operators (IV-F-1, IV-F-3). Another commenter stated that EPA has no authority to directly regulate tank trucks under Section 111, and EPA cannot do indirectly what it cannot do directly (citing Brown v. EPA, 566 F.2d 665 (9th Cir. 1977)) (IV-D-35).

Response: For purposes of this NSPS, the stationary source, or affected facility, is the total of all bulk terminal loading racks loading liquid product into gasoline tank trucks. Those loading racks are essential to carrying out the activity known as product loading. While product loading involves both the affected facility and mobile equipment, including the tank truck, it is clearly a stationary activity, since it requires no movement from the affected facility site. Among the pollutants created by product loading are vapors forced from the tank truck as a direct result of the pumping of liquid product into the tank truck. Since escape of these vapors is caused by stationary activities at a stationary facility, they are "stationary source" emissions subject to regulation under Section 111 -- even though the tank trucks from which they escape during that activity have the capability to move.

As indicated above, the tank truck is not included in the designation of the "affected facility" under these standards. The standards place responsibility on the terminal owner only, requiring the owner to restrict loadings to vapor-tight tank trucks equipped with compatible vapor collection equipment. The regulation would not directly require either new or old tank trucks to be vapor-tight or equipped with certain types of hardware. (See next comment and response.)

Section 111(a)(2) defines "stationary source" as any "building, structure, facility, or installation which emits or may emit any air pollutant." EPA identifies the "stationary source" as certain specified stationary equipment (termed the "affected facility") that "emits" a pollutant. In the Administrator's view, stationary equipment "emits" a pollutant if it causes that pollutant to enter the atmosphere. EPA's authority to define the term "emits" in this way derives from Section 301 of the Act, as interpreted in the cases (see, e.g., Alabama Power v. Costle, 636 F.2d 323 (D.C. Cir. 1979)). In accordance with this provision, the Agency is interpreting the term "emits" broadly, to serve the broad purposes of Section 111 (described in the text below).

In the Administrator's view, affected facility emissions subject to regulation under Section 111 include all pollutants that enter the atmosphere as a result of the stationary industrial activities at the affected facility, even those that enter the atmosphere after contacting equipment with mobility. Stated differently, the test for whether emissions are "stationary source" emissions subject to regulation under Section 111 is whether the emissions are caused by a stationary facility during activities that require no movement from the facility, not whether the emissions escape to the atmosphere without touching equipment having the capability to move.

Interpreting "stationary source" emissions to include emissions resulting from stationary activities in which both the affected facility and some mobile equipment take part serves the intent of the statute. Congress enacted Section 111 for the "overriding purpose" of "prevent[ing] new pollution problems." S. Rep. No. 91-1196, 1970 Leg. Hist. at 416. The Senate Report states that Section 111 seeks to attain this goal by requiring control of new commercial and industrial establishments "to the maximum practicable degree regardless of their ... industrial operations." Id. Similarly, the Report states that "maximum use of available means of preventing and controlling air pollution is essential" to the attainment of the goals of Section 111. Id. The legislative history thus indicates that Congress intended Section 111 to address emissions from all stationary operations at industrial establishments when the Agency can identify the maximum practicable degree of control for these emissions. To interpret Section 111(a)(2) so that emissions resulting from certain stationary activities involving the stationary source would not constitute "stationary source" emissions simply because those emissions pass through some equipment with the capability to move would be incompatible with that intent.

The Ninth Circuit Court of Appeals case cited by the commenter casts no doubt on EPA's authority to regulate these vapors as emissions from the loading rack. That case stands for the proposition that under the Clean Air Act, as amended in 1977, a State highway is not an "indirect source" of pollution simply by virtue of the State's failure to adopt an inspection and maintenance program to control pollutants emitted by automobiles that travel on those highways. The decision turns primarily on the legislative history of Section 110. The Court in no way implied that when pollutants escape as a direct result of a stationary activity at an industrial unit, those pollutants are not "stationary source" emissions within the intent of Section 111.

The Agency recognizes that promulgation of standards regulating loading racks as "stationary sources" may significantly affect tank truck owners and other segments of the Petroleum Transportation and Marketing industry. That standards within an agency's statutory authority indirectly affect nonregulated entities, however, does not in itself diminish the authority to set the standards. Nothing in the statute or its history indicates that, in the case at hand, the indirect impact of loading rack standards on certain tank truck owners deprives the Agency of its clear authority to set these new source performance standards. Nor does the case cited by the commenter suggest that otherwise valid regulation of "stationary sources" is rendered invalid simply because the regulation indirectly affects other segments of the industry involved.

In fact, it is likely that most NSPS's based in whole or in part on process changes affect industries other than that to which the standards directly apply. The standards for electric utility steam generators (40 CFR 60.40a-49a), for instance, significantly affect several other industries. Those standards are based on a combination of scrubbing and coal washing. For this reason, they will affect vitally the coal-washing and scrubbing industries. Similarly, the NSPS's for different coating application industries (e.g., the metal furniture industry), based typically on use of low-solvent coatings, will undoubtedly affect manufacturers of low-solvent coatings, high-solvent coatings, and coating application equipment.

The impact on tank trucks of a requirement that certain bulk terminals load only into vapor-tight trucks equipped with compatible equipment does not differ in kind from the indirect impacts resulting from these other new source performance standards. Bulk terminals deal extensively with delivery vehicles. As a result, it is to be expected that regulation of bulk terminals would affect delivery vehicles in some manner, particularly in connection with the most significant activity at bulk terminals -- product loading. It was not Congress's intent that because of this effect EPA may not set bulk terminal emission standards otherwise authorized by Section 111.

Nor does the potential effect on tank truck owners amount to a denial of due process or an unconstitutional taking of property. Because the commenter did not elaborate on the specific bases for these claims of unconstitutionality, the Agency can respond only generally. The Clean Air Act reflects a congressional determination that air pollution has a substantial effect on interstate commerce and therefore may be regulated by Congress (and, through proper delegation, EPA) under the commerce clause. District of Columbia v. Train, 521 F.2d 971, 988 (D.C. Cir. 1975). It is unreasonable to suggest that regulation of emissions forced from the tank truck during loading bears no rational relationship to protection of public health and welfare, and thus violates the due process clause of the Fifth Amendment. There is a rational relationship between escape of these vapors and the public health and welfare, because these emissions contribute to ozone formation. Sierra Club v. EPA, 540 F.2d 1114, 1139 (D.C. Cir. 1976). There is also a proper legislative purpose underlying the requirements aimed at controlling these emissions. Moreover, the means the Agency has chosen, as discussed above, are reasonable and appropriate. Id., at 1139 n.80 (citing Heart of Atlanta Motel, Inc. v. United States, 379 U.S. 241, 258-59 (1964)).

Nor do these standards transgress the takings prohibition in the Constitution. Given the substantial public interest in preserving clean air, tight restrictions may constitutionally be imposed on private property. South Terminal Corp. v. EPA, 504 F.2d 646, 678-80 (1st Cir. 1974). While this NSPS indirectly limits the uses of tank trucks, the limitation is not so extreme as to constitute an appropriation of the vehicles. Sierra Club v. EPA, supra, at 1140. This regulation affects only one of the tank truck uses available to the truck owner -- loading at affected facilities. The right to use nonvapor-tight tank trucks at other facilities is neither extinguished nor transferred to someone else.

2.10.2 Loading Restrictions by Terminal Operators

Comment: One commenter claimed that EPA does not have the authority to confer upon terminals the police power of a government to inspect, control, regulate, and certify the equipment (tank trucks) owned by other private commercial corporations and taxpayers, or to require terminals to undertake and perform the tasks and responsibilities of EPA. A terminal operator could be subject to lawsuits by tank truck operators if the proposed restrictions on tank truck loadings were carried out (IV-D-13).

Response: In requiring terminal owners to restrict loading at affected facilities to vapor-tight trucks with compatible vapor collection equipment, EPA is not attempting to confer government police power on terminal owners. Rather, the Agency is requiring terminal owners to exercise control over loading activities conducted at their facilities. These requirements are based on the assumption that because loading is carried out with equipment largely owned by the terminal owners, with the owners' permission and on their property, it is reasonable to charge these owners with responsibility for the emissions that result from loading.

Thus, in accordance with Section 111, EPA is requiring terminal owners to take certain steps to assure that VOC emissions from activities reasonably considered to be under the owners' control are reduced to the level reflecting application of the best system of continuous emission reduction. Nothing in the statute indicates that EPA lacks authority to establish such standards that may effectively require owners to exercise some control over the activities of persons using the owners' facilities.

As described earlier in Section 2.9.1, the promulgated regulation specifies a method of compliance that would permit terminal owners to meet the standards without manning the affected racks on a 24-hour basis. The revised compliance requirements will limit the owner's responsibility under the promulgated standards.

The Agency cannot determine how the promulgated requirements will result in lawsuits by tank truck operators against terminal owners. The commenter did not provide an explanation and the Agency is not aware of the basis for the commenter's suggestion. Therefore, EPA does not at this time consider it appropriate to speculate about the legal problems that might arise between terminal and tank truck owners.

2.10.3 Setting of an Operational Standard

Comment: One commenter stated that the requirements on terminal owners and operators to control the access of gasoline tank trucks is a "work practice" or "operational" standard, which may be promulgated only instead of standards of performance, according to Section 111(b)(1) and (2) of the Clean Air Act. Since a standard of performance has been set, the operational standard is inappropriate (IV-D-35).

Response: Under Section 111, the standards EPA sets must reflect application of the best demonstrated technological system of continuous emission reduction to the affected facility. The Agency has determined that the best demonstrated system for controlling VOC emitted during tank truck loading is the combination of the following actions: restricting loading to vapor-tight tank trucks; collecting the vapors that can be captured by installing a vapor collection system and connecting the system during loading; and controlling emissions from the vapor collection system with an adsorber, an oxidizer, or some other acceptable system.

The Agency has determined that even after applying this system at loading racks, it is both technologically and economically impracticable to measure total organic compound emissions from the loading process for the purpose of comparing the amount of emissions to a numerical emission limit. This is because residual fugitive (leakage) emissions from vapor-tight trucks still escape directly to the atmosphere and are not captured by the vapor collection system. Section 111(h) permits EPA to set work practice and equipment standards "instead of" a standard of performance for those sources for which it would not be feasible to prescribe and enforce a standard of performance. The statute states that prescribing such a standard is not feasible where the measurement is technologically or economically impracticable. Accordingly, the Agency is including in this regulation a work practice standard aimed at controlling emissions from leaks and similar emission sources during loading. This would require that loading be restricted to vapor-tight trucks.

Complementing this requirement are additional equipment and operational requirements assuring the effectiveness of the vapor tightness standards. Specifically, these requirements seek to minimize the chance that those vapors not able to escape through leaks in the vapor-tight tank are emitted through a number of other potential escape routes in the loading system. These standards require that: (1) each loading rack be equipped with a vapor collection system designed to collect the vapors displaced from the tank truck during loading; (2) gasoline loadings into tank trucks be limited to those equipped with compatible vapor collection equipment; (3) the racks' vapor collection system be designed to prevent any vapors collected at one loading rack from passing to another loading rack; (4) the two vapor collection systems be connected during each loading of a gasoline tank truck; (5) the vapor collection and liquid loading equipment be designed and operated to prevent excess gauge pressure during loading; (6) the terminal's vapor collection system be designed so that no pressure-vacuum vent begins to open below the specified cutoff pressure; and (7) the collection and loading equipment be inspected for leaks at certain times during loading.

The primary result of these steps is that most vapors will become centralized in the terminal's vapor collection system. Only from this source is it technologically and economically practicable to measure TOC emissions. The Agency has established a standard of performance for vapors collected by the vapor collection system because it is feasible to prescribe and enforce such a standard for these emissions.

In sum, the Agency is setting equipment and work practice standards "instead of" a standard of performance to control those fugitive emissions for which measurement is impracticable. EPA is establishing a standard of performance for those emissions for which measurement is practicable. This action accords with the language of Section 111(h) and Congress's intent that, where feasible, the Agency establish emission limitations.

2.10.4 Setting of an Equipment Standard

Comment: One commenter felt that, since it is not desirable to burn collected vapors, the carbon adsorption system was being proposed as the only control technology to achieve the standard. This was said to constitute an equipment standard which is contrary to the requirements of Section 111(h) (IV-D-31).

Response: Section 111 requires EPA to set standards achievable through application of the best demonstrated technology. Even if the statutory factors pointed to selection of only one technology as the best demonstrated technology for controlling the vapors collected by the vapor collection system, the emission limit based on that technology would not constitute a standard requiring the use of particular equipment (for which a Section 111(h) finding would be necessary). Rather, a standard based on the use of one technology would still permit source owners to use any system of continuous emission reduction capable of meeting the limit; e.g., one that may not have been demonstrated for use by the entire industry, but which is demonstrated for use at a particular type of source. Furthermore, owners are free under the standard of performance to apply for technology waivers under Section 111(j) to obtain EPA approval to use certain innovative technologies to meet the numerical limit.

In any event, the Agency has determined that for this industry, two technologies--oxidation and carbon adsorption--are the best demonstrated technology. While in some cases a source owner may prefer not to use oxidation, in the Agency's judgment both technologies are adequately demonstrated, considering adverse impacts.

2.11 REFERENCES

I-2[b] U.S. Environmental Protection Agency. Priority list and additions to the list of categories of stationary sources, final rule. Washington, D.C. Office of the Federal Register. August 21, 1979.

II-A-4 Amoco Oil Company. Demonstration of Reduced Hydrocarbon Emissions from Gasoline Loading Terminals. U.S. Environmental Protection Agency. Publication No. EPA-650/2-75-042. June 1975. 51 p.

II-A-5 Betz Environmental Engineers, Incorporated. Emissions from Gasoline Transfer Operations at Exxon Company, USA, Baytown Terminal, Baytown, Texas. U.S. Environmental Protection Agency. Research Triangle Park, N.C. EMB Report. No. 75-GAS-8. September 1975. 75 p.

II-A-6 Betz Environmental Engineers, Incorporated. Emissions from Gasoline Transfer Operations at Exxon Company, USA, Philadelphia Terminal, Philadelphia, Pennsylvania. U.S. Environmental Protection Agency. Research Triangle Park, N.C. EMB Report No. 75-GAS-10. September 1975. 91 p.

II-A-9 Compilation of Air Pollution Emission Factors, Transportation and Marketing of Petroleum Liquids. U.S. Environmental Protection Agency. Publication No. AP-42. February 1976.

II-A-10 Betz Environmental Engineers, Incorporated. Gasoline Vapor Recovery Efficiency Testing at Bulk Transfer Terminals Performed at Diamond Shamrock, Incorporated, Terminal, Denver, Colorado. U.S. Environmental Protection Agency. Research Triangle Park, N.C. Contract No. 68-02-1407, Task 12. Project No. 76-GAS-16. September 1976. 98 p.

II-A-11 Betz Environmental Engineers, Incorporated. Gasoline Vapor Recovery Efficiency Testing at Bulk Transfer Terminals Performed at Pasco-Denver Products Terminal. U.S. Environmental Protection Agency. Research Triangle Park, N.C. Contract No. 68-02-1407. Project No. 76-GAS-17. September 1976. 97 p.

II-A-14 Betz Environmental Engineers, Incorporated. Gasoline Vapor Recovery Efficiency Testing at Bulk Transfer Terminals Performed at the Texaco Terminal, Westville, New Jersey. U.S. Environmental Protection Agency. Research Triangle Park, N.C. EMB Report No. 77-GAS-18. November 1976. 87 p.

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[b] These numbers correspond to the docket item number in Docket No. A-79-52.

II-A-17 Scott Environmental Technology, Incorporated. Gasoline Vapor Recovery Efficiency Testing Performed at the Phillips Fuel Company Bulk Loading Terminal, Hackensack, New Jersey. U.S. Environmental Protection Agency. Research Triangle Park, N.C. EMB Report No. 77-GAS-19. October 1977. 47 p.

II-A-18 Polglase, W., et al. Control of Hydrocarbons from Tank Truck Gasoline Loading Terminals. U.S. Environmental Protection Agency. Publication No. EPA-450/2-77-026. October 1977.

II-A-23 The Research Corporation of New England. Report on Performance Test of Vapor Control System at the Amoco Terminal, Baltimore, Maryland. U.S. Environmental Protection Agency. Philadelphia, Pennsylvania. Contract No. 68-01-4145, Task 12. September 1978. 133 p.

II-A-24 The Research Corporation of New England. Report on Performance Test of Vapor Control System at Belvoir Terminal, Newington, Virginia. U.S. Environmental Protection Agency. Philadelphia, Pennsylvania. Contract No. 68-01-4145. September 1978. 105 p.

II-A-25 The Research Corporation of New England. Report on Performance of Vapor Control System at Boron Terminal, Coraopolis, Pennsylvania. U.S. Environmental Protection Agency. Philadelphia, Pennsylvania. Contract No. 68-01-4145, Task 12. September 1978. 104 p.

II-A-26 The Research Corporation of New England. Report on Performance Test of Vapor Control System at British Petroleum Terminal, Finksburg, Maryland. U.S. Environmental Protection Agency. Philadelphia, Pennsylvania. Contract No. 68-01-4145, Task 12. September 1978. 69 p.

II-A-27 The Research Corporation of New England. Report on Performance Test of Vapor Control System at the Combined Citgo, Gulf, Texaco, and Amoco Terminals, Fairfax, Virginia. U.S. Environmental Protection Agency. Philadelphia, Pennsylvania. Contract No. 68-01-4145, Task 12. September 1978. 117 p.

II-A-28 The Research Corporation of New England. Report on Performance Test of Vapor Control System at Crown Central Terminal, Baltimore, Maryland. U.S. Environmental Protection Agency. Philadelphia, Pennsylvania. Contract No. 68-01-4145, Task 12. September 1978. 125 p.

II-A-29 The Research Corporation of New England. Report on Performance Test of Vapor Control System at Texaco Terminal, Coraopolis, Pennsylvania. U.S. Environmental Protection Agency. Philadelphia, Pennsylvania. Contract No. 68-01-4145, Task 12. September 1978. 80 p.

II-A-32 Shedd, S.A., et al. Control of VOC Leaks from Gasoline Tank Trucks and Vapor Collection Systems. U.S. Environmental Protection Agency. Publication No. EPA-450/2-78-051. December 1978.

II-A-37 The Research Corporation of New England. Report on Performance Test of HydroTech Carbon Bed Vapor Control System at Phillips Fuel Oil Terminal, Hackensack, New Jersey. U.S. Environmental Protection Agency. New York, N.Y. Contract No. 68-01-4145, Task 12. April 1979. 215 p.

II-A-38 The Research Corporation of New England. Report on Performance Test of Parker Hannifin, CRA Vapor Control System at Mobil Terminal, Paulsboro, New Jersey. U.S. Environmental Protection Agency. New York, N.Y. Contract No. 68-01-4145, Task 36. April 1979. 212 p.

II-A-39 The Research Corporation of New England. Report on Performance of Gesco, CRC Vapor Control System at Sunoco Terminal, Newark, New Jersey. U.S. Environmental Protection Agency. New York, N.Y. Contract No. 68-01-4145, Task 36. April 1979. 141 p.

II-A-40 The Research Corporation of New England. Report on Performance Test of Tenney Refrigeration Vapor Control System at Amerada Hess Terminal, Pennsauken, New Jersey. U.S. Environmental Protection Agency. New York, N.Y. Contract No. 68-01-4145, Task 36. April 1979. 175 p.

II-A-41 The Research Corporation of New England. Report on Performance Test of Tenney Refrigeration Vapor Control Systems at Exxon Terminal, Paulsboro, New Jersey. U.S. Environmental Protection Agency. New York, N.Y. Contract No. 68-01-4145, Task 36. April 1979. 185 p.

II-A-42 The Research Corporation of New England. Report of Performance Test of Trico-Superior CRA Vapor Control System at ARCO Terminal, Woodbury, New Jersey. U.S. Environmental Protection Agency. New York, N.Y. Contract No. 68-01-4145, Task 36. April 1979. 231 p.

II-A-43 The Research Corporation of New England. Report on Performance Test of Edwards Refrigeration Vapor Control System at Tenneco Terminal, Newark, New Jersey. U.S. Environmental Protection Agency. New York, N.Y. Contract No. 68-01-4145, Task 36. April 1979. 171 p.

II-A-47 McCarthy, R.J. Economic Impact of Vapor Control Regulations on Bulk Storage Industry. Arthur D. Little, Inc. Publication No. EPA-450/5-80-001. June 1979.

II-A-50 Scott Environmental Technology, Inc. Gasoline Vapor and Benzene Control Efficiency of Chevron Loading Terminal, Perth Amboy, New Jersey. U.S. Environmental Protection Agency. Research Triangle Park, N.C. EMB No. 78-BEZ-5. May 1978. 166 p.

II-B-46 Memorandum from Polglase, W., Environmental Protection Agency (CPDD), to Helms, G.T., Environmental Protection Agency (CPDD). September 19, 1979. Summary of SIP VOC regulations.

II-B-54 Memorandum from Norton, R.L., Pacific Environmental Services, Incorporated to Shedd, S., Environmental Protection Agency. August 22, 1980. Trip report to Aminoil terminal in Stockton, California.

II-B-55 Memorandum from Norton, R.L., Pacific Environmental Services, Incorporated, to Shedd, S., Environmental Protection Agency. August 22, 1980. Trip report to Union Oil terminal in Los Angeles, California.

II-B-56 Memorandum from Norton, R.L., Pacific Environmental Services, Incorporated, to Shedd, S., Environmental Protection Agency. August 22, 1980. Trip report to Aminoil terminal in West Sacramento, California.

II-B-57 Memorandum from Norton, R.L., Pacific Environmental Services, Incorporated, to Shedd, S., Environmental Protection Agency. August 22, 1980. Trip report to Shell Oil terminal in Los Angeles, California.

II-B-58 Memorandum from Norton, R.L., Pacific Environmental Services, Incorporated, to Shedd, S., Environmental Protection Agency. August 22, 1980. Trip report to SOHIO terminal in Cuyahoga Heights and Niles, Ohio.

II-B-59 Memorandum from Norton, R.L., Pacific Environmental Services, Incorporated, to Shedd, S., Environmental Protection Agency. August 22, 1980. Trip report to STC Corporation in Stockton, California.

II-B-61 Memorandum from Norton, R.L., Pacific Environmental Services, Incorporated, to Shedd, S., Environmental Protection Agency. August 22, 1980. Trip report to ARCO terminal in Stockton, California.

II-D-41 Letter and attachment from McGill, G., HydroTech Engineering, Inc., to Shedd, S., Environmental Protection Agency. July 6, 1977. Comments on EPA test of carbon adsorption unit.

II-D-84	Letter from McGill, J.C., HydroTech Engineering, to Kleeberg, C.F., Environmental Protection Agency. November 3, 1978. Comments on carbon adsorption units and carbon life.
II-D-118	Letter and attachments from McLaughlin, W.F., Husky Oil Company, to Goodwin, D.R., Environmental Protection Agency. June 5, 1979. Response to Section 114 letter on terminals.
II-D-121	Letter and attachments from Crane, R.E., Triangle Refineries, Incorporated, to Goodwin, D.R., Environmental Protection Agency. June 18, 1979. Response to Section 114 letter on terminals.
II-D-122	Letter and attachments from McGirr, J.J., F.L. Roberts and Company, to Goodwin, D.R., Environmental Protection Agency. June 21, 1979. Response to Section 114 letter on terminals.
II-D-124	Letter and attachments from Woodard, D.E., Standard Oil Company (Ind.), to Goodwin, D.R., Environmental Protection Agency. June 25, 1979. Response to Section 114 letter on terminals.
II-D-125	Same as Docket Item No. II-D-124 (Confidential information).
II-D-127	Letter and attachments from Karkalik, K.J., Standard Oil of Ohio, to Goodwin, D.R., Environmental Protection Agency. July 5, 1979. Response to Section 114 letter on terminals.
II-D-128	Letter and attachments from Bond, F.K., ARCO Petroleum Products, to Goodwin, D.R., Environmental Protection Agency. July 6, 1979. Response to Section 114 letter on terminals.
II-D-129	Same as Docket Item No. II-D-128 (Confidential information).
II-D-130	Letter and attachments from Hooper, L.R., Marathon Oil Company, to Goodwin, D.R., Environmental Protection Agency. July 13, 1979. Response to Section 114 letter on terminals.
II-D-131	Letter and attachments from Martin, D.P., Gulf Oil Company, to Goodwin, D.R., Environmental Protection Agency. July 24, 1979. Response to Section 114 letter on terminals.
II-D-132	Letter and attachments from Beall, F.J., Texaco, Incorporated, to Goodwin, D.R., Environmental Protection Agency. July 30, 1979. Response to Section 114 letter on terminals.
II-D-133	Same as Docket Item No. II-D-132 (Confidential information).
II-D-134	Letter and attachments from Weber, G.H., Chevron U.S.A., Incorporated, to Goodwin, D.R., Environmental Protection Agency. August 9, 1979. Response to Section 114 letter on terminals.

II-D-135	Letter and attachments from Richardson, D.K., Mobil Oil Company, to Goodwin, D.R., Environmental Protection Agency. August 14, 1979. Response to Section 114 letter on terminals.
II-D-136	Letter and attachments from Sparveri, A.J., Automatic Comfort, Corporation, to Goodwin, D.R., Environmental Protection Agency. August 16, 1979. Response to Section 114 letter on terminals.
II-D-137	Same as Docket Item No. II-D-136 (Confidential information).
II-D-138	Letter and attachments from Ada, A.E., Exxon Corporation, to Goodwin, D.R., Environmental Protection Agency. September 5, 1979. Response to Section 114 letter on terminals.
II-D-149	Letter and attachments from Perry, F.R., California Air Resources Board, to Farmer, J.R., Environmental Protection Agency. November 30, 1979. Comments on draft BID Volume I and four test reports.
II-E-34	Telecon. Norton, R.L., Pacific Environmental Services, Incorporated, with Pitruzello, V., EPA Region II, February 6, 1979. Information on new terminal development in Region II.
II-E-35	Telecon. Collins, F., EPA Region IV, with Norton, R.L., Pacific Environmental Services, Incorporated. February 6, 1979. Information on new terminals in Florida.
II-E-36	Telecon. Norton, R.L., Pacific Environmental Services, Incorporated, with Ikalainen, B., EPA Region I, February 6, 1979. Information on new terminals in Region I.
II-E-37	Telecon. Thayil, B., EPA Region V, with Norton, R.L., Pacific Environmental Services, Incorporated. February 7, 1979. Information on new terminals in Region V.
II-E-38	Telecon. Sydmore, J., EPA Region III, with Norton, R.L., Pacific Environmental Services, Incorporated. February 9, 1979. Information on new terminals in Region III.
II-E-41	Telecon. Davidson, I.W., Getty Oil, with Norton, R.L., Pacific Environmental Services, Incorporated. February 12, 1979. Information on new terminal construction.
II-E-42	Telecon. Norton, R.L., Pacific Environmental Services, Incorporated, with Yee, D., EPA Region IX, February 12, 1979. Information on new terminals in Region IX.
II-E-43	Telecon. Norton, R.L., Pacific Environmental Services, Incorporated, with Potter, G., Exxon Company, U.S.A. February 12, 1979. Information on new terminal construction.

II-E-44 Telecon. Norton, R.L., Pacific Environmental Services, Incorporated, with Hooper, M., EPA Region X. February 14, 1979. Information on new terminals in Region X.

II-E-46 Telecon. Wright, G., EPA Region VII, with Norton, R.L., Pacific Environmental Services, Incorporated. February 15, 1979. Information on new terminals in Region VII.

II-E-47 Telecon. Perry, A.W., Union Oil Company, with Norton, R.L., Pacific Environmental Services, Incorporated. February 15, 1979. Information on new terminal construction.

II-E-48 Telecon. Wheeler, D., EPA Region VII, with Norton, R.L., Pacific Environmental Services, Incorporated. February 20, 1979. Information on new terminals in Region VII.

II-E-49 Telecon. Dougherty, C., Texaco, Incorporated, with Norton, R.L., Pacific Environmental Services, Incorporated. March 1, 1979. Information on new terminal construction.

II-E-51 Telecon. Norton, R.L., Pacific Environmental Services, Incorporated, with Ruffing, J., Allegheny County BAPC. April 2, 1979. Information on new terminals in Allegheny County.

II-E-68 Telecon. Norton, R.L., Pacific Environmental Services, Incorporated, with Bolsted, J., Montana Air Quality Board. June 7, 1979. Information on method of loading at uncontrolled terminals.

II-E-69 Telecon. Norton, R.L., Pacific Environmental Services, Incorporated, with Anderson, A., Georgia Department of Natural Resources. June 7, 1979. Information on SIP coverage of terminals in Georgia.

II-E-74 Telecon. Edwards, R.C., Edwards Engineering, with LaFlam, G.A., Pacific Environmental Services, Incorporated. July 2, 1979. Information on costs and performance of refrigeration units.

II-E-75 Telecon. Schmidt, E., Edwards Engineering, with LaFlam, G.A., Pacific Environmental Services, Incorporated. July 3, 1979. Information on costs of carbon adsorption units.

II-E-79 Telecon. LaFlam, G.A., Pacific Environmental Services, Incorporated, with Welpe, B., Hunn Corporation. July 11, 1979. Cost information on installation of vapor control systems.

II-E-85 Telecon. Edwards, R., Edwards Engineering, with LaFlam, G.A., Pacific Environmental Services, Incorporated. August 21, 1979. Information on capabilities of refrigeration units.

II-E-93 Telecon. LaFlam, G.A., Pacific Environmental Services, Incorporated, with Malek, B., Petrochem Cons., Incorporated. October 16, 1979. Provided corrections to Section 114 letter.

II-E-94 Telecon. LaFlam, G.A., Pacific Environmental Services, Incorporated, with Maxwell, S., HydroTech Engineering. October 18, 1979. Information on costs of carbon adsorption add-on units.

II-E-99 Telecon. LaFlam, G.A., Pacific Environmental Services, Incorporated, with Schmidt, E., HydroTech Engineering. November 7, 1979. Information on costs of carbon replacement for carbon adsorption systems.

II-E-126 Telecon. LaFlam, G.A., Pacific Environmental Services, Incorporated, with Beall, F.J., Texaco, Incorporated. January 18, 1980. Information on use of open splash loading.

II-E-127 Telecon. LaFlam, G.A., Pacific Environmental Services, Incorporated, with Percy, A.W., Union Oil Company. January 18, 1980. Information on use of open splash loading.

II-I-69 Norton, R.L. Monitoring Procedures for Fugitive Hydrocarbon Emissions from Gasoline Tank Truck Loading. Paper at APCA 73rd meeting, Montreal, Quebec. June 22, 1980.

IV-A-2 Battye, W., et al. Control of Hydrocarbon Emissions from Gasoline Loading by Refrigeration Systems. U.S. Environmental Protection Agency. Publication No. EPA-600/7-81-121. July 1981.

IV-B-2 Memorandum from Norton, R.L., Pacific Environmental Services, Incorporated, to Shedd, S., Environmental Protection Agency. March 23, 1981. Trip report of March 9, 1981, meeting with Bay Area Air Quality Management District regarding Edwards refrigeration source test.

IV-B-4 Memorandum from Norton, R.L., Pacific Environmental Services, Incorporated, to Shedd, S., Environmental Protection Agency. March 23, 1981. Trip report to ARCO terminal for monitoring testing.

IV-B-6 Memorandum from Norton, R.L., Pacific Environmental Services, Incorporated, to Docket A-79-52. April 28, 1981. Trip reports to BP, Texaco, and AMOCO terminals.

IV-C-9 Letter and attachments from LaFlam, G.A., Pacific Environmental Services, Incorporated, to Smith, W.S., Entropy Environmentalists. February 19, 1981. Summary of meeting held February 9, 1981, regarding vapor recovery at bulk terminals.

IV-D-15	Letter from Bierck, R.C., Dean Brothers Pumps, Incorporated, to Shedd, S.A., Environmental Protection Agency. February 18, 1981. Information on pump performance.
IV-D-47	Letter and attachments from McDaniel, R.R., Southern Pacific Pipe Lines, to LaFlam, G.A., Pacific Environmental Services, Incorporated. April 2, 1981. Information on operating data for vapor recovery units.
IV-D-48	Letter and attachments from Bossi, F.R., Calgon Corporation, to LaFlam, G.A., Pacific Environmental Services, Incorporated. April 8, 1981. Information on various control technologies.
IV-D-49	Letter and attachments from Kaitschuck, J., John Zink Company, to LaFlam, G.A., Pacific Environmental Services, Incorporated. April 15, 1981. Information on carbon adsorption unit.
IV-D-51	Letter and attachments from Schmidt, E.L., McGill, Incorporated, to Norton, R.L., Pacific Environmental Services, Incorporated. April 30, 1981. Information on prices and power consumption for vapor processors.
IV-D-54	Letter and attachments from Surla, E., Indiana State Board of Health, to Gschwandtner, K.C., Pacific Environmental Services, Incorporated. March 30, 1981. Performance and compliance test results.
IV-D-55	Letter and attachments from St. Louis, R., Pennsylvania Department of Environmental Resources, to Gschwandtner, K.C., Pacific Environmental Services, Incorporated. May 27, 1981. Performance and compliance test results.
IV-D-56	Letter and attachments from Weinberg, B.D., Ohio Environmental Protection Agency, to Gschwandtner, K.C., Pacific Environmental Services, Incorporated. June 4, 1981. Performance and compliance test results.
IV-D-57	Letter and attachments from St. Louis, R., Pennsylvania Department of Environmental Resources, to Gschwandtner, K.C., Pacific Environmental Services, Incorporated. June 12, 1981. Performance and compliance test results.
IV-E-3	Telecon. LaFlam, G.A., Pacific Environmental Services, Incorporated, with Edwards, R., Edwards Engineering Corporation. February 23, 1981. Information on refrigeration units.
IV-E-10	Telecon. LaFlam, G.A., Pacific Environmental Services, Incorporated, with Bierck, R., Dean Brothers Pumps, Incorporated. March 4, 1981. Information on Dean Brothers pumps.

IV-E-11 Telecon. LaFlam, G.A., Pacific Environmental Services, Incorporated, with Perry, F.R., California Air Resources Board. March 6, 1981. Information on bottom loading vapor balance emission factor.

IV-E-12 Telecon. Norton, R.L., Pacific Environmental Services, Incorporated, to Stoddard, B., Shell Oil Company. March 18, 1981. Clarification of Shell comment on recommended control unit monitoring program.

IV-E-18 Telecon. Bossi, F.R., Calgon Corporation, with LaFlam, G.A., Pacific Environmental Services, Incorporated. April 3, 1981. Information on overheating of carbon adsorption units.

IV-E-20 Telecon. LaFlam, G.A., Pacific Environmental Services, Incorporated, with Kaitschuck, J., John Zink Company. April 14, 1981. Information on carbon adsorption units.

IV-E-22 Telecon. Gschwandtner, K.C., Pacific Environmental Services, Incorporated, with Todd, J., Heil Company. April 14, 1981. Information on tank truck conversion costs.

IV-E-23 Telecon. Gschwandtner, K.C., Pacific Environmental Services, Incorporated, with Mr. Glidden, Tennile Company. April 15, 1981. Information on tank truck conversion costs.

IV-E-24 Telecon. Gschwandtner, K.C., Pacific Environmental Services, Incorporated, with Hemphill, R., Fruehauf Corporation. April 20, 1981. Information on tank truck conversion costs.

IV-E-25 Telecon. Gschwandtner, K.C., Pacific Environmental Services, Incorporated, with Botkin, L., Fruehauf Corporation. April 20, 1981. Information on tank truck conversion costs.

IV-E-26 Telecon. Gschwandtner, K.C., Pacific Environmental Services, Incorporated, with Ritterbush, J., J & L Tanks. April 20, 1981. Information on tank truck conversion costs.

IV-E-29 Telecon. Zanitsch, R., Calgon Corporation, with LaFlam, G.A., Pacific Environmental Services, Incorporated. April 22, 1981. Information on carbon adsorption units.

IV-E-30 Telecon. Norton, R.L., Pacific Environmental Services, Incorporated, with McGill, J., McGill, Incorporated. April 23, 1981. Information on carbon adsorption units.

IV-E-32 Telecon. LaFlam, G.A., Pacific Environmental Services, Incorporated, with Edwards, R., Edwards Engineering Company. April 28, 1981. Information on refrigeration units.

IV-E-33 Telecon. LaFlam, G.A., Pacific Environmental Services, Incorporated, with Welpe, B., Hunn Corporation. April 29, 1981. Information on cost of loading rack conversions.

IV-E-36 Telecon. Schmidt, E., McGill, Incorporated, with Norton, R.L., Pacific Environmental Services, Incorporated. April 30, 1981. Information on carbon adsorption units.

IV-E-38 Telecon. Lowery, E., ARCO, with LaFlam, G.A., Pacific Environmental Services, Incorporated. May 5, 1981. Information on maintenance and electrical costs of Edwards DE Model refrigeration unit.

IV-E-39 Telecon. LaFlam, G.A., Pacific Environmental Services, Incorporated, with Ottoson, R.S., Ray Construction Company, Incorporated. May 6, 1981. Information on design and costs associated with loading rack conversions.

IV-E-40 Telecon. LaFlam, G.A., Pacific Environmental Services, Incorporated, with Ogden, J., Union Oil Company. May 7, 1981. Information on maintenance costs of carbon adsorption units.

IV-E-41 Telecon. Norton, R.L., Pacific Environmental Services, Incorporated, with Stahl, R., AMOCO Oil Company. May 7, 1981. Information on maintenance costs of carbon adsorption units.

IV-E-42 Telecon. Norton, R.L., Pacific Environmental Services, Incorporated, with Dale, A., Phillips Petroleum Company. May 8, 1981. Information on operating and maintenance costs of carbon adsorption units.

IV-E-43 Telecon. Norton, R.L., Pacific Environmental Services, Incorporated, with Durbin, R., AMOCO Research. May 11, 1981. Information on sight glasses installed on carbon adsorption units.

IV-E-45 Telecon. Deardorff, K., JACA Corporation, with Moorehead, A., Federal Energy Regulatory Commission. May 19, 1981. Information on price pass through for pipelines.

IV-E-46 Telecon. Deardorff, K., JACA Corporation, with Sado, J., Interstate Commerce Commission. May 19, 1981. Information on price pass through for independent tank truckers.

IV-E-52 Telecon. Lorden, J., Phillips Petroleum Company, with LaFlam, G., Pacific Environmental Services, Incorporated. September 22, 1981. Cost-effectiveness of SIP controls at bulk terminals.

IV-E-53 Telecon. Durbin, R., AMOCO Research, with LaFlam, G., Pacific Environmental Services, Incorporated. September 28, 1981. Field experience and technical problems with carbon adsorption units.

IV-E-54 Telecon. Norton, R.L., Pacific Environmental Services, Incorporated, with Jones, K., California Air Resources Board. November 5, 1981. Discussion of bulk terminal tests.

IV-J-1 California Air Resources Board. Certification Evaluation Report No. C-9-021 of Edwards Vapor Recovery Unit. May 1979.

IV-J-2 California Air Resources Board. Certification Evaluation Report No. C-9-072 of McGill Vapor Recovery Unit. May 1980.

IV-J-3 California Air Resources Board. Certification Evaluation Report No. C-9-073 of McGill Vapor Recovery Unit. May 1980.

IV-J-4 California Air Resources Board. Certification Evaluation Report No. C-80-034 of Edwards Vapor Recovery Unit. June 1980.

IV-J-5 California Air Resources Board. Certification Evaluation Report No. C-9-058 of Hirt Vapor Recovery Unit. August 1980.

IV-J-6 California Air Resources Board (CARB) proceedings on vapor recovery consultation meeting. March 17, 1978. CARB staff report on public hearing to revise suggested vapor recovery rules. July 27, 1978.

IV-J-8 Edwards Engineering Corporation. Hydrocarbon vapor recovery units price list. January 1, 1981.

IV-J-10 Marketplace at a Glance. National Petroleum News. 73(4). April 1981.

IV-J-15 API Bulletin on Evaporation Loss from Tank Cars, Tank Trucks, and Marine Vessels. American Petroleum Institute. API Bulletin 2514. November 1959.

IV-J-16 California Air Resources Board. Certification Evaluation Report No. C-80-047 of McGill Vapor Recovery Unit. June 1980.

IV-J-17 LaFlam, G.A., Osbourn, S., and Norton, R.L. Documentation for AP-42 Emission Factors: Section 4.4 Transportation and Marketing of Petroleum Liquids. U.S. Environmental Protection Agency. Research Triangle Park, N.C. May 1982.

IV-J-21 Bottom Loading and Vapor Recovery for MC-306 Tank Motor Vehicles. American Petroleum Institute. API RP 1004. September 1, 1977.

APPENDIX A

EMISSION SOURCE TEST DATA

APPENDIX A - EMISSION SOURCE TEST DATA

A.1 INTRODUCTION

A major group of the comments received after proposal of the standards questioned the adequacy of the emission test data which served as the basis for the selected emission limit of 35 milligrams of TOC per liter of gasoline loaded. Commenters claimed that: state-of-the-art control equipment was not represented in the testing (Section 2.6.1); the systems selected as best available technology have not been adequately demonstrated (Section 2.6.3); certain technologies show marginal performance or have operating problems which make them unsuitable choices (Sections 2.6.7, 2.6.8, and 2.6.10); and additional test data should be collected (Section 2.6.6).

Although the test data presented at the time of proposal are considered adequate to support the selected limit, the Agency has continued to collect results of recent testing in order to obtain the largest possible data base. The intent was to review these recent tests of the current generation of vapor processors in order to verify their performance under a broader range of operating conditions. Additional test data on the carbon adsorption, refrigeration, and thermal oxidation type systems were obtained from State pollution control agencies, oil companies, and a control unit manufacturer. Section A.2 presents these data and discusses the results in terms of the 35 mg/liter emission limit.

A.2 SUMMARY OF ADDITIONAL TEST ACTIVITY

Results of tests performed between 1979 and 1981 to demonstrate compliance with SIP requirements are presented in Table A-1. These test results were not available to EPA until after Appendix C of BID,

Table A-1. BULK TERMINAL EMISSION TEST DATA SUMMARY

Test ID No.	Test Date	Control Unit[a]	Volume Loaded (liters)[b]	Inlet C[c]	Outlet C[c]	Control Efficiency (percent)	Processor Emissions (mg/liter)[d]	Docket Item Reference
1	6/6/79	CA	100,550[e]	41.7[f]	0.64[f]	99.0	5.9	IV-D-54
1a	9/21/79	CA	h	h	0.30	90.3	h	IV-D-54
2	4/29-30/80[m]	CA	701,650[g]	h	0.30	h	6.9	IV-J-2
3	5/21-22/80[m]	CA	2,469,900[g]	h	0.30	h	7.9	IV-J-3
4	7/8/80	CA	421,500[g]	h	0.24	h	6.0	IV-D-56
5	7/9/80	CA	439,200[g]	3.3	0.15	95.6	6.2	IV-D-56
6	7/10/80	CA	375,150[g]	3.0	0.19	94.0	7.9	IV-D-56
7[i]	7/80	CA	h	14.0	h	h	5.9	IV-D-38
8[i]	8/80	CA	h	5.7	h	h	4.2	IV-D-38
9[i]	9/80	CA	h	6.3	h	h	8.4	IV-D-38
10	9/16/80	CA	243,200[e]	23.6	0.05	99.6	1.2	IV-D-49
11	9/17/80	CA	132,500[e]	20.1	0.01	99.9	0.34	IV-D-49
12	9/17/80	CA	194,100[e]	11.1	0.02	99.8	0.42	IV-D-49
13	9/22/80	CA	124,800[g]	6.74	0.05	99.3	0.66	IV-D-56
14	9/26/80	CA	488,200[g]	8.37	0.25	97.3	4.5	IV-D-38,56
15	9/29/80	CA	1,223,200[g]	4.86	0.86	83.2	15.6	IV-D-56
16	10/1/80	CA	387,700[g]	6.63	0.19	97.3	6.3	IV-D-38,56
17	10/1/80	CA	223,600[g]	h	0.17	h	1.8	IV-D-60
18	10/2/80	CA	367,150[g]	h	2.25	h	17.9	IV-D-60
19	10/3/80	CA	728,150[g]	6.22	0.39	94.1	11.0	IV-D-38,56
20	10/6/80	CA	834,850[g]	5.93	0.12	98.0	2.3	IV-D-56
21	10/10/80	CA	63,900[g]	8.0	0.13	98.5	5.0	IV-D-56
22[i]	10/80	CA	h	6.4	h	h	13.1	IV-D-38
23	11/12/80	CA	172,200[g]	h	0.44	h	4.8	IV-D-57
24	11/13/80	CA	265,350[g]	h	0.51	h	5.6	IV-D-57
25	11/14/80	CA	174,900[g]	h	0.50	h	4.5	IV-D-57
26	12/9/80	CA	202,500[g]	h	0.51	h	7.7	IV-D-60
27[i]	1/6/81	CA	443,200[e]	h	h	h	1.7	IV-D-55
28	1/8/81	CA	165,800[g]	19.2	0.10	99.5	7.5	IV-D-60
29	2/2/81	CA	102,950[g]	27.7	0.05	99.9	1.6	IV-D-60
30	2/6/81	CA	184,700[g]	22.8	0.05	99.8	1.6	IV-D-60
31	2/11/81	CA	136,650[g]	20.0	0.05	99.8	5.2	IV-D-60
32	1/22/81	CA	613,000[g]	19.7	0.05	99.8	1.5	IV-D-60
33	2/04/81	CA	306,950[g]	30.2	0.05	99.9	1.2	IV-D-57,60
34	5/29-30/80[m]	REF	784,550[g]	h	1.40	h	21.9	IV-J-4
35	3/26/81	REF	1,006,000[g]	h	1.75	h	22.6	IV-D-57
36	2/19-20/81[m]	REF	1,288,200[g]	h	1.45[j]	h	41.8	IV-B-2
37	5/13-14/80[m]	TO[k]	2,353,700[g]	h	2 ppm	99	1.2	IV-J-5
38	12/16/80	TO	205,200[g]	h	Negl.	h	0.20	IV-D-60
39	1/20/81	TO	162,550[g]	h	Negl.	h	0.22	IV-D-57

NOTES FOR TABLE A-1

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[a] CA - Carbon Adsorption.
REF - Refrigeration.
TO - Thermal Oxidation.

[b] Total volume of all products or gasoline only actually loaded during test period.

[c] Volume percent TOC concentration as propane, except as noted.

[d] Mass emissions in terms of gasoline volume loaded where known; otherwise, in terms of all products loaded.

[e] Total products loaded, or not determinable from test report.

[f] Weight percent of total hydrocarbons.

[g] Volume of gasoline loaded.

[h] No data.

[i] No test report available.

[j] Volume percent TOC concentration as butane.

[k] Compression-oxidation type system.

[m] 24-hour test.

Volume I (Emission Source Test Data) was prepared. Thus, the results could not be considered as background information for the proposed standards. While these data were not used to determine the emission limit which represents the performance of the best available systems, they have served as additional information against which to compare and evaluate the selected limit.

None of these recent tests was performed by EPA, and only the test reports are available as information sources. Details regarding test methods, conditions at the terminals, and methods of calculation are often incomplete. However, enough information is presented for most of the test results to be evaluated in terms of the test methods and procedures developed for use by new sources under the NSPS. For many of the tests, results were adjusted to correspond to the NSPS reporting criteria. All throughputs in Table A-1 are reported as the volume of gasoline loaded during the test, where this information was available, and emission levels are reported in terms of this quantity. Thus, some of the data in Table A-1 differ from the values contained in the test reports.

The following subsections contain brief discussions of the tests in Table A-1, including an evaluation of the reliability of the data. A more detailed evaluation has been prepared by EPA's Emission Measurement Branch (IV-B-10).

A.2.1 Test Data Evaluation

Some of the test reports indicate only slight deviations from the NSPS test procedures (which are a combination of Methods 2A, 2B, 21, 25A, 25B, and 27), and thus the results are considered essentially acceptable. However, in other cases, very different test procedures were used, introducing a bias and uncertainty regarding several of the measured and calculated results. Where possible, the extent of bias was estimated, and a determination was made as to the applicability of the tests as supporting information. The individual tests are discussed briefly in the following subsections, grouped according to the party which performed the tests, since each party used the same testing approach for all of its tests.

A.2.1.1 Tests by Firm A. Firm A conducted terminal test nos. 4, 5, 6, 13, 14, 15, 16, 19, 20, and 21 on CA units at eight terminals during the summer and fall of 1980 (test nos. 4, 5, and 6 were conducted at the same terminal on consecutive days). Deviations from the NSPS procedures probably introduced a certain amount of bias into the results.

Since no information about the terminal and processor operating conditions is given in the reports, it is impossible to determine the representativeness of the testing or the relative load on the processor during testing. Gasoline throughput in test nos. 13 and 21 was considerably less than the recommended 300,000 liters. Each test was conducted for 8 hours.

In measuring outlet TOC concentrations, instrument calibrations were performed less frequently than recommended, reducing confidence in the accuracy of the measurements. Reduction of strip chart data included time periods when no loading was taking place, which would tend to bias the results low. Outlet volumes were determined using nonstandard methods.

The reports for these tests are well-documented and contain sufficient information to allow thorough report evaluations. In spite of probable low biases in reported results, if the outlet concentration were determined correctly, the mass emission rate from all of these CA systems would likely be below 35 mg/liter.

A.2.1.2 Tests by Firm B. Firm B conducted test nos. 27, 28, 29, 30, 31, 32, and 33 on CA systems at seven terminals during January and February of 1981. Deviations from NSPS procedure and lack of detailed documentation reduce confidence in these test results.

Insufficient information is provided to determine the representativeness of the terminal and processor operation during testing. Several tests (four out of seven) do not satisfy the 300,000 liter minimum throughput requirement. Documentation is not sufficient to determine whether Method 25B calibration procedures were used. Also, no-loading periods were apparently averaged into the time averages of outlet TOC concentration, biasing the results low.

An air-balance procedure was used to determine the outlet gas volume used in calculating the mass emission rate. This nonstandard procedure is not comparable to the recommended method (2A), and the results are questionable.

Reported outlet emissions range between 1.2 and 7.5 mg/liter. Even if the reported outlet TOC concentration values (0.05 percent) were low by a factor of 10 to 20, the outlet emissions in these tests would still most likely be below 35 mg/liter.

A.2.1.3 Tests by Firm C. Firm C conducted test nos. 1, 17, 18, 23, 24, 25, 26, 38, and 39 at nine terminals. The first seven tests were on CA type units; test nos. 38 and 39 were on TO type units. As in the tests discussed previously, several deviations from NSPS procedures and reference methods lead to uncertainties regarding the accuracy of the reported test results.

Since no information is provided about the terminal or vapor processor operations during the tests, the representativeness of the testing cannot be determined. Most of the 1-day tests did not meet the throughput criterion, but the combined throughputs during the 3-day test (test nos. 23, 24, and 25) and the 2-day test (test nos. 17 and 18) constitute a sufficient business volume for a meaningful test.

The methods used to measure outlet volume are not documented, and so the values cannot be accepted as accurate. Concentration values are similarly unacceptable because of the apparent large deviations from recommended procedures. However, if the concentration values are accepted as accurate within ±100 percent, all of the tests except test no. 18 would probably demonstrate compliance with the 35 mg/liter limit.

A.2.1.4 Tests by Firm D. Four bulk terminal vapor processors were tested by Firm D: two CA units (test nos. 2 and 3), one REF unit (test no. 34), and one TO unit (test no. 37). These tests were conducted to determine compliance with the California limit of 0.6 lb/1000 gallons (72 mg/liter). The description given of the terminal and processor operations allows an evaluation to be made regarding the representativeness of the testing. The written procedure of the California Air Resources Board (CARB), which is similar to the NSPS procedure, was followed in these tests.

All four tests exceed the 300,000 liter throughput criterion. However, the tests were conducted for 24 hours, and the low business volume hours were included, probably biasing the results low. Also, the instrument specifications and the calibration procedure, which are not as strict as the recommended procedure, reduce confidence in the results. Finally, mass emissions were calculated using 24-hour average values, instead of the 5-minute averages specified in the NSPS procedure. This would usually bias the results low.

Mass emission rates in all tests were considerably below the 35 mg/liter limit, and even with some low bias accounted for, test nos. 2, 3, and 37 would still likely meet this limit.

A.2.1.5 Other Tests. Test no. 1a was conducted by Firm E on a CA unit. This test was an efficiency test, and emissions in units of mg/liter were not determined. The test was short-term (3.5 hours, with 41 minutes of loading time), and an air-balance procedure was used. However, if outlet TOC concentrations were measured correctly, the processor would probably meet the 35 mg/liter limit.

Test nos. 10, 11, and 12 were conducted by Firm F on a CA unit at one terminal. These three 1-day tests (9, 5, and 8 hours, respectively) are well-documented, allowing a thorough evaluation of the results to be made. The NSPS procedure was generally followed, and the results are considered acceptable. However, reported outlet TOC concentrations are considered to be too low, since they are below the lowest detectable limit of the Horiba PIR-2000 NDIR detector used to measure outlet concentration. The processor would likely meet the limit of 35 mg/liter, even if true concentrations were 0.5 to 1.0 percent, an increase of 10 to 20 fold above the reported outlet concentrations.

Test no. 35 was performed by Firm F on a dual refrigeration unit. The test procedure is generally similar to the NSPS procedures, although detailed calibration documentation is not provided. The results are considered acceptable, with the processor shown to be attaining the 35 mg/liter limit.

Test no. 36 was performed by Firm G on a dual refrigeration system. Although documentation is not complete, the CARB procedure was most likely followed, and so the results can be marginally accepted. This processor slightly exceeded the 35 mg/liter limit.

The results for test nos. 7, 8, 9, and 22 were received by EPA in tabular form, without any test reports or supporting documentation. Since no documentation is presently available to EPA, the results of these four tests, all of which indicated emissions below 35 mg/liter for CA systems, are not acceptable as supporting information for the emission limit of the new source standards.

A.3 CONCLUSIONS

The nominal emission results reported to the States in these tests are seen to be considerably below the limit of 35 mg/liter. Even after a consideration of the low bias which appears to exist in most tests, the results most likely still substantiate the selected limit. As in the tests performed by EPA and reported in Appendix C of BID, Volume I, these recent State tests were performed on vapor processors designed to comply with State limits of 72 to 80 mg/liter. State-of-the-art CA and TO processors designed for State limits routinely achieve emission levels below 35 mg/liter. Manufacturers' claims and theoretical analyses indicate that REF processors can be designed, sized, and operated for improved performance over currently installed systems. Many current REF systems are achieving the 35 mg/liter limit.

A.4 REFERENCES

IV-B-2[b]	Memorandum from Norton, R.L., Pacific Environmental Services, Incorporated, to Shedd, S., Environmental Protection Agency. March 23, 1981. Trip report of March 9, 1981, meeting with Bay Area Air Quality Management District regarding Edwards refrigeration source test.
IV-B-10	Memorandum from McLaughlin, N.D., Emission Measurement Branch, EPA, to Ajax, R.L., and Colyer, R., Standards Development Branch, EPA. February 19, 1982. Review of Terminal Test Reports.
IV-D-38	Letter and attachments from Karkalik, E.J., The Standard Oil Company of Ohio, to Colyer, R., Environmental Protection Agency. March 13, 1981. SOHIO comments and enclosed exhibit emission test reports.
IV-D-49	Letter and attachments from Kaitschuck, J., John Zink Company, to LaFlam, G.A., Pacific Environmental Services, Incorporated. April 15, 1981. Information on carbon adsorption unit.
IV-D-54	Letter and attachments from Surla, E., Indiana State Board of Health, to Gschwandtner, K.C., Pacific Environmental Services, Incorporated. March 30, 1981. Performance and compliance test results.
IV-D-55	Letter and attachments from St. Louis, R., Pennsylvania Department of Environmental Resources, to Gschwandtner, K.C., Pacific Environmental Services, Incorporated. May 27, 1981. Performance and compliance test results.
IV-D-56	Letter and attachments from Weinberg, B.D., Ohio Environmental Protection Agency, to Gschwandtner, K.C., Pacific Environmental Services, Incorporated. June 4, 1981. Performance and compliance test results.
IV-D-57	Letter and attachments from St. Louis, R., Pennsylvania Department of Environmental Resources, to Gschwandtner, K.C., Pacific Environmental Services, Incorporated. June 12, 1981. Performance and compliance test results.
IV-D-60	Letter and attachments from St. Louis, R., Pennsylvania Department of Environmental Resources, to Gschwandtner, K.C., Pacific Environmental Services, Incorporated. July 16, 1981. Performance test reports.
IV-J-2	California Air Resources Board. Certification Evaluation Report No. C-9-072 of McGill Vapor Recovery Unit. May 1980.

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[b] These numbers correspond to the docket item number in Docket No. A-79-52.

IV-J-3 California Air Resources Board. Certification Evaluation Report No. C-9-073 of McGill Vapor Recovery Unit. May 1980.

IV-J-4 California Air Resources Board. Certification Evaluation Report No. C-80-034 of Edwards Vapor Recovery Unit. June 1980.

IV-J-5 California Air Resources Board. Certification Evaluation Report No. C-9-058 of Hirt Vapor Recovery Unit. August 1980.

APPENDIX B

COST AND ECONOMIC IMPACTS

APPENDIX B - COST AND ECONOMIC IMPACTS

B.1 INTRODUCTION

Both cost and economic analyses of various regulatory alternatives were presented in Sections 8.2 and 8.4 of BID, Volume I. Most of the cost estimates were made in 1979, and all costs were converted to the equivalent of mid-1979 dollars, generally using the "Chemical Engineering Plant Cost Index." This was necessary so that all costs could be compared on the basis of monetary units of equal value.

When the regulation was proposed in December 1980, several commenters remarked that many of the costs were out-of-date and/or underestimated. Principal among these were vapor processor purchase, installation, operating, and maintenance costs (see Section 2.5.3 of this document); loading rack and tank truck conversion and testing costs (Sections 2.5.3, 2.5.4, and 2.5.5); and total costs to industry (Section 2.5.1). It is clear that costs estimated during a particular time period are likely to appear low at some later period, especially during highly inflationary times. In order to respond to the comments concerning costs, all of the principal cost figures were re-evaluated in order to retain the ability to make valid cost comparisons. Section B.2 presents updated control costs, and Section B.3 discusses the effect which these costs have on industry economic impacts.

B.2 CURRENT CONTROL COST ESTIMATES

B.2.1 Model Plant Costs

Tables 8-31 and 8-34 of BID, Volume I, were revised to produce two new tables containing current control costs for the four model plants. Table B-1 presents the costs to comply with the standards for new and existing bottom-loaded terminals in areas with no SIP regulation. While the costs to an existing facility affected by the standards may be slightly more than to a new facility, the higher costs are presented and presumed to apply in both cases. Table B-2 presents costs for an existing top-loaded terminal in an area with no SIP control. This type of terminal would incur additional costs over a bottom-loaded

Table B-1. ESTIMATED CONTROL COSTS - NEW AND EXISTING BULK TERMINALS BOTTOM LOADED, NO SIP CONTROL (Thousands of First Quarter 1981 Dollars)

Gasoline Throughput:	380,000 ℓ/day			950,000 ℓ/day			1,900,000 ℓ/day			3,800,000 ℓ/day		
Vapor Processing Unit:	CA[a]	TO[b]	REF[c]	CA[a]	TO[b]	REF[c]	CA[a]	TO[b]	REF[c]	CA[a]	TO[b]	REF[c]
Capital Investment												
Unit Purchase Cost	128	108	134	155	118	138	163	118	138	210	122	176
Unit Installation Cost	109	91.8	114	132	100	117	139	100	117	179	104	150
Continuous Monitor[d]	13.0	15.0	13.0	13.0	15.0	13.0	13.0	15.0	13.0	13.0	15.0	13.0
Truck Vapor Recovery Cost[e]	9.0	9.0	9.0	18.0	18.0	18.0	27.0	27.0	27.0	60.0	60.0	60.0
Annual Operating Costs												
Electricity[h]	6.6	3.0	19.1	9.8	7.7	21.6	15.1	14.3	21.6	28.3	27.3	28.6
Propane (Pilot)[i]	----	3.0	----	----	5.4	----	----	9.9	----	----	13.0	----
Carbon Replacement[j]	1.2	----	----	1.8	----	----	1.8	----	----	2.1	----	----
Maintenance[k]	5.7	4.9	6.0	7.0	5.5	6.3	7.3	5.5	6.3	9.4	5.9	8.0
Operating Labor[l]	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1
Compliance Cost[m]	5.7	6.2	5.7	5.7	6.2	5.7	5.7	6.2	5.7	5.7	6.2	5.7
Subtotal (Direct Operating Cost)	24.3	22.2	35.9	29.4	29.9	38.7	35.0	41.0	38.7	50.6	57.5	47.4
Truck Maintenance[n]	0.9	0.9	0.9	1.8	1.8	1.8	2.7	2.7	2.7	6.0	6.0	6.0
Capital Charges[p]	61.5	52.2	64.2	76.2	59.0	68.2	82.2	61.2	70.5	112	71.5	96.5
Gasoline Recovery (Credit)[q]	(28.2)	--	(28.2)	(70.6)	--	(70.6)	(141)	--	(141)	(282)	--	(282)
Net Annualized Cost	58.5	75.3	72.8	36.8	90.7	38.1	-21.1	105	-29.1	-113	135	-132
Total VOC Controlled (Mg/yr)[r]	65.2	65.2	65.2	163	163	163	326	326	326	652	652	652
Cost-Effectiveness ($/kg)	0.90	1.15	1.12	0.23	0.56	0.23	(s)	0.32	(s)	(s)	0.21	(s)

Table B-2. ESTIMATED CONTROL COSTS - EXISTING BULK TERMINALS
TOP LOADED, NO SIP CONTROL
(Thousands of First Quarter 1981 Dollars)

Gasoline Throughput:	380,000 ℓ/day			950,000 ℓ/day			1,900,000 ℓ/day			3,800,000 ℓ/day		
Vapor Processing Unit:	CA[a]	TO[b]	REF[c]	CA[a]	TO[b]	REF[c]	CA[a]	TO[b]	REF[c]	CA[a]	TO[b]	REF[c]
Capital Investment												
Unit Purchase Cost	128	108	134	155	118	138	163	118	138	210	122	176
Unit Installation Cost	109	91.8	114	132	100	117	139	100	117	179	104	150
Continuous Monitor[d]	13.0	15.0	13.0	13.0	15.0	13.0	13.0	15.0	13.0	13.0	15.0	13.0
Rack Conversion Cost[f]	400	400	400	600	600	600	600	600	600	800	800	800
Truck Conversion Cost[g]	19.2	19.2	19.2	38.4	38.4	38.4	57.6	57.6	57.6	128	128	128
Annual Operating Costs												
Electricity[h]	6.6	3.0	19.1	9.8	7.7	21.6	15.1	14.3	21.6	28.3	27.3	28.6
Propane (Pilot)[i]	---	3.0	----	---	5.4	----	----	9.9	----	----	13.0	----
Carbon Replacement[j]	1.2	---	----	1.8	---	----	1.8	----	----	2.1	----	----
Maintenance[k]	5.7	4.9	6.0	7.0	5.5	6.3	7.3	5.5	6.3	9.4	5.9	8.0
Operating Labor[l]	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1
Compliance Cost[m]	5.7	6.2	5.7	5.7	6.2	5.7	5.7	6.2	5.7	5.7	6.2	5.7
Subtotal (Direct Operating Cost)	24.3	22.2	35.9	29.4	29.9	38.7	35.0	41.0	38.7	50.6	57.5	47.4
Truck Maintenance[n]	0.9	0.9	0.9	1.8	1.8	1.8	2.7	2.7	2.7	6.0	6.0	6.0
Capital Charges[p]	164	155	167	231	214	223	240	219	228	329	288	314
Gasoline Recovery (Credit)[q]	(28.2)	--	(28.2)	(70.6)	--	(70.6)	(141)	--	(141)	(282)	--	(282)
Net Annualized Cost	161	178	176	192	246	193	137	263	128	104	352	85.4
Total VOC Controlled (Mg/yr)[r]	65.2	65.2	65.2	163	163	163	326	326	326	652	652	652
Cost-Effectiveness ($/kg)	2.47	2.73	2.69	1.18	1.51	1.18	0.42	0.81	0.39	0.16	0.54	0.13

NOTES FOR TABLES B-1 AND B-2

[a] Carbon Adsorption Unit.

[b] Thermal Oxidation Unit.

[c] Refrigeration Unit.

[d] Includes one performance test plus $5,000 equipment cost.

[e] Cost of installing vapor collection equipment on existing bottom loading tank trucks, $3,000 per truck.

[f] Cost of converting top loading racks to bottom loading and vapor recovery, $200,000 per rack.

[g] Cost of retrofitting existing top loading tank trucks with bottom loading and vapor collection equipment, $6,400 per tank truck.

[h] Electricity costs are based on average consumption rates reported by manufacturers.

[i] Propane for pilot burner estimated at 12.5 liters per hour, at $0.18 per liter.

[j] Estimated activated carbon replacement period is 10 years, at $3.85 per kilogram carbon cost.

[k] Estimated as 4 percent of unit purchase cost, plus annual rack vapor collection maintenance of $200 per rack and $200 per terminal.

[l] Daily system inspections at 1 hour per day, plus a monthly inspection for liquid and vapor leaks in the vapor collection and processing systems.

[m] Includes capital charges on continuous monitor investment plus $2,500 annual operating cost.

[n] Cost to perform annual vapor tightness testing, including one-half day downtime, $300 per truck.

[p] Total capital investment (less monitor) x (capital recovery factor + 0.04), where interest rate = 17 percent, equipment economic life = 10 years.

NOTES FOR TABLES B-1 AND B-2 (Concluded)

[q] Amount recovered per year, at $0.29 per liter.

[r] Difference between uncontrolled submerged fill loading and NSPS level of control.

[s] Cost-effectiveness not calculated because net annualized cost is a negative quantity (cost credit).

terminal to convert its loading racks and tank trucks to a bottom-loading configuration, which is a substantial additional cost.

Control unit purchase and installation costs are the same in both tables. Current purchase costs have been obtained from manufacturers for carbon adsorption (CA) (IV-D-51, IV-E-20, IV-E-36), refrigeration (REF) (IV-E-3, IV-E-32, IV-J-8), and thermal oxidation (TO) type units (IV-E-35, IV-E-37). Prices for CA and TO units represent the average for two manufacturers, and REF prices represent a single manufacturer. While the average price of TO units has risen 15 percent, CA and REF prices have decreased 13 and 17 percent, respectively, from previously reported values. The estimate of installation cost as 85 percent of purchase cost has been retained (see Section 2.5.3). The cost of continuous monitors has been added to the tables, using the reference costs for Compliance Option 2 in Table 8-38 of BID, Volume I.

The costs for converting tank trucks and loading racks to a bottom loading/vapor recovery configuration were reassessed through contacts with companies currently performing these conversions (see Section 2.5.5) (IV-E-22, IV-E-24, IV-E-25, IV-E-26). While costs vary for trucks of different configurations, the previous cost of $6,400 for a bottom loading/vapor recovery tank truck conversion still represents a good average for Table B-2. The cost of adding vapor recovery provisions alone has increased from $1,600 and $2,400 (cost adder on new tank truck and conversion cost on older truck, respectively) to $2,000 and $3,000. The higher value of $3,000 has been used for both new and existing terminal cases in Table B-1. The costs associated with loading rack conversions are highly variable, depending on the level of work to be done. The costs attributable to the standard must represent the basic conversion which is necessary for compliance with the standard to be achieved. It is often in a terminal's interest to perform general modernization and equipment replacement during a rack conversion project. This may include costs for improvements in concrete driveways, drainage systems, fire protection, or structures. Contacts with construction contractors involved in recent projects of this type indicate that the previous estimate of $160,000 per rack conversion may represent the low end of the range for a basic conversion (IV-E-33, IV-E-39). To reflect this increase, a cost of $200,000 has been assumed for Table B-2.

Electrical operating costs were re-evaluated by contacting manufacturers and users of CA (IV-E-20, IV-E-40, IV-E-42), REF (IV-D-47, IV-E-32, IV-E-38, IV-J-8), and TO units (IV-E-35, IV-E-37). Annual power costs for Tables B-1 and B-2 were calculated using the manufacturers' reported unit power consumption, daily operating schedules for each type of unit, 340 days of operation, and power cost of $0.06 per kilowatt-hour (see Section 2.5.3). Calculated costs are generally confirmed by the costs reported by users, but considerable variability may be expected in individual cases due to unit control settings, terminal schedules, and climatic conditions. The cost of propane used for the pilot burners of TO units has been raised from $0.12 per liter to the current price of $0.18 per liter. The price of activated carbon has increased from $3.30 per kilogram to $3.85 per kilogram (IV-E-30). The cost of maintaining a vapor processor is quite variable, but user input indicates that this cost can be represented quite well as 4 percent of the unit purchase cost (see Section 2.5.3). This percentage is unchanged for CA and TO units, but represents a considerable reduction from the previous value of 8 percent assumed for REF units. Newer generation units appear to have lower maintenance requirements than the brine systems which make up a considerable percentage of the existing population of refrigeration units. The additional rack vapor recovery maintenance cost of $200 per rack annually, plus $200 per facility has been retained unchanged. The level of operating labor required to perform daily unit checks and a monthly leak inspection is assumed to remain valid, but the hourly rate has been increased from $10 per labor-hour to $15 per labor-hour to cover the expected inflation rate over the next several years as well as the possibility of more technically oriented personnel being employed to check continuous monitors. The annual compliance cost in both tables represents Compliance Option 2 in Table 8-38 of BID, Volume I. The total direct operating costs for the model plants are generally higher than the previous values presented in BID, Volume I, primarily due to higher electrical consumption and the addition of compliance costs.

Tank truck maintenance costs, representing the annual vapor tightness test, have been increased from $150 to $300 per truck, to include the estimated one-half day of lost revenue due to transport downtime during the test. Capital charges on the initial investment have been re-calculated to account for a higher interest rate. If the rate is 17 percent, then for an equipment economic life of 10 years the capital recovery factor (Table 8-22 of BID, Volume I) would be 0.21. Adding property taxes, insurance, and administrative costs of 0.04, the capital charges total 25 percent of the total capital cost. Capital charges on the continuous monitors are included separately under the compliance cost. The gasoline recovery cost credits are calculated as before, using revised values of gasoline price and total gasoline recovered. The nationwide average wholesale price for regular leaded gasoline during first quarter 1981 was approximately $0.29 per liter (IV-J-10). The gasoline recovery rates in Table 8-25 of BID, Volume I, were mistakenly based on an uncontrolled emission factor of 960 mg/liter in areas with no SIP regulation of gasoline loading at bulk terminals. If the correct emission factor of 600 mg/liter (submerged loading, normal service) is used, the recovery rate is:

600 mg/liter - (0.10)(600 mg/liter) - 35 mg/liter = 505 mg/liter,

or 39 percent lower than the previous figure of 829 mg/liter. The recovery cost credits entered in Tables B-1 and B-2 are thus $28,200, $70,600, $141,000, and $282,000, which average only 4 to 5 percent higher than the previous estimates. Because of the lowered emission factor referred to above, the total annual VOC controlled has been reduced by 39 percent for all model plants.

Most net annualized costs presented in Tables B-1 and B-2 have increased from the previously presented values. Annualized costs for CA and REF installations at previously bottom-loaded terminals are 22 and 14 percent higher, respectively, than before for Model Plants 1 and 2. These costs remain negative for Model Plants 3 and 4, indicating that terminals in this size range (greater than 1,400,000 liters/day throughput) installing CA or REF units would realize a net income from the installation. New annual costs for TO installations, however, have increased an average of 61 percent in the cost re-evaluation, causing them to appear less competitive for all model plant sizes. In particular, whereas the TO installation previously involved the lowest net annualized cost for Model Plant 1, the revised estimates indicate the TO installation to involve net costs which are 29 and 3 percent higher, respectively, than CA and REF installations. All net annualized costs shown in Table B-2 for top-loaded terminals affected by the regulation are higher than previous estimates. Section B.3 discusses the economic impact considerations of the revised cost estimates.

The compression-oxidation systems discussed on page 4-12 of BID, Volume I, have not been included in the revised tables because the gasoline recovery rate has not been determined (IV-E-27). One system tested recently in California showed over 99 percent control efficiency (emissions less than 1.2 mg/liter), and it was estimated that 22 gallons were recovered during a gasoline throughput of 2.3 million liters in 24 hours (IV-J-5). Preliminary estimates indicate that the net cost for this system would be higher than for any of the three units shown in the tables.

B.2.2 Nationwide Control Costs

The cost impacts on the bulk terminal and for-hire tank truck industries have been re-calculated based on the updated model plant and tank truck costs discussed in Sections 2.5 and B.2.1. Several changes have been made to the calculations.

Based on industry responses to Section 114 letter requests for information, it is estimated that five new bulk terminals will be built in the first five years of the standard (Table 8-12 of BID, Volume I). As noted on page 3-26 of BID, Volume I, approximately 71 percent of the nationwide gasoline loading at existing terminals will be controlled to the level recommended by the terminal CTG. This implies that about 71 percent, or three of the five new terminals, are likely to be constructed in areas already requiring emission control to the 80 mg/liter limit. Since the NSPS will require an emission limitation to 35 mg/liter, there may be added costs associated with achieving this limit as compared to the SIP limit of 80 mg/liter. Although these added costs are likely only in the case of refrigeration recovery systems (since current CA and TO units can meet the lower limit), they have been accounted for in the case of all three of these terminals to assess worst case costs. The costs of installing and operating continuous monitors, outlined in Tables B-1 and B-2, have also been included for these terminals. The remaining two terminals in areas with no SIP control will incur the full costs summarized in Table B-1. One Model Plant 2 and one Model Plant 3 have been assumed for these terminals (the largest terminals are expected in SIP-controlled areas, which are generally associated with the higher-demand urban areas). The previous analysis was based on the incorrect assumption that all five new terminals would incur the full control costs of the standard.

It was assumed that, since all state-of-the-art CA and TO units are considered capable of meeting the 35 mg/liter limit, the REF unit would be the typical choice of a terminal owner intending to comply with an 80 mg/liter limit. The costs for a REF system meeting 35 mg/liter were presented in Table B-1. Purchase prices of $128,000 and $134,000 for Model Plant 3 and 4 size units meeting 80 mg/liter were obtained from the manufacturer's current price list (IV-J-8). The lower prices of the less efficient units created lower installation, electricity, and maintenance costs, as well as lower capital charges than for the units meeting 35 mg/liter. Electrical costs for the 80 mg/liter units were assumed to be 50 percent less than these costs for the 35 mg/liter units, as suggested by the manufacturer (IV-E-32). The gasoline recovery cost credit for units controlling to 35 mg/liter is greater, which tends to offset the increased purchase and operating costs of these units. In fact, for the Model Plant 3 size terminal in this situation, the net annualized cost is $1,000 less for the 35 mg/liter system than for the 80 mg/liter system. All net costs remain negative, however, indicating that more money would be made from recovered product than would be spent to operate the control system.

All terminals replacing or adding onto existing systems to meet the NSPS limit were assumed to be represented by Model Plant 2 for the purpose of the calculations. The assumptions used to derive Tables 8-35 and 8-36 of BID, Volume I, were retained, but updated costs corresponding to those in Table B-1 were substituted.

The cost per unit of emission reduction was also reviewed for each of the cases associated with the standard. These costs are shown in Table B-3. The cost per unit emission reduction was considered excessive for cases 3a and 3b. Based upon these costs and the fact that EPA does not feel it is reasonable to require costly add-on controls or replacements of recently installed equipment at bulk gasoline terminals, EPA decided that existing control devices meeting 80 mg/liter would not require additional emission reduction.

The previous cost analysis also assumed that 25 of the 30 modified or reconstructed terminals in attainment areas would become affected facilities due to loading rack conversions and would incur the costs summarized in Table 8-34 of BID, Volume I (new Table B-2), because conversion of these previously top loading racks to bottom loading would be required to meet the emission limit of the standard. However, since no SIP requirements led to the conversions and because the loading rack conversion was the item that triggered the reconstruction provisions of the standards, the cost impact of the conversions themselves will not be attributable to the standard, and so the costs summarized in Table B-1 will apply. Only 5 of the 30 modified or reconstructed terminals in attainment areas in the first 5 years would become affected facilities for reasons other than top to bottom loading conversions. However, it is estimated that two of these terminals will already use bottom loading, leaving three terminals which will incur the full costs shown in Table B-2. Based on the distribution of terminal sizes (Table 8-4 of BID, Volume I), two of these terminals will be of Model Plant 1 size and one terminal will be of Model Plant 2 size.

Table B-4 presents the number and sizes of the terminals expected to incur control costs as a result of the standard, as well as the per-facility costs as shown in Tables B-1 and B-2. The costs associated with CA, TO, and REF installations were averaged for Model Plant 1, whereas only CA and REF costs were averaged for Model Plants 2 and 3. The incremental costs of meeting 35 mg/liter instead of 80 mg/liter, and the costs of continuous monitors applied to existing control systems, both not contained in Tables B-1 and B-2, were derived using the assumptions described above.

Table B-3. COST EFFECTIVENESS FOR VARIOUS BULK TERMINAL MODEL PLANT CASES

Case[a]	Quantity	Model Plant 1 ($/Mg)[c]	Quantity	Model Plant 2 ($/Mg)[c]	Quantity	Model Plant 3 ($/Mg)[c]	Quantity	Model Plant 4 ($/Mg)[c]
1	13	1100	8	340	8	(s)[d]	-[e]	
2	2	2600	1	1300	-		-	
3a	-		5	6000			-	
3b	-		5	4300	-		-	
4	-		-		1	(s)[d]	2	450
TOTAL[b]	15		19		9		2	

[a] Case 1: New, modified, or reconstructed terminals in areas unaffected by SIP regulations (Table B-1).
Case 2: Modified or reconstructed terminals requiring bottom loading conversion (Table B-2).
Case 3a: Terminals replacing an existing SIP-level (80 mg/liter) control system.
Case 3b: Terminals adding onto an existing SIP-level (80 mg/liter) control system.
Case 4: New terminals installing NSPS-level equipment instead of SIP-level equipment (CRA or REF units only).

[b] Remaining 10 of the 55 affected terminals will have previously installed equipment which meets 35 mg/liter.

[c] Cost effectiveness is the average of the control devices. TO included in averages for Model Plants 1 and 2, excluded in average for Model Plants 3 and 4.

[d] (s) = cost savings.

[e] "-" = no affected terminals assumed in this model plant size.

TABLE B-4. FIVE-YEAR NATIONWIDE COSTS TO BULK TERMINAL INDUSTRY
(Thousand of First Quarter 1981 Dollars)

Bulk Terminals Affected			Capital Investment		Net Annualized Cost	
Case[a]	Model Plant	No. of Occurences	Investment/Terminal	Total	Cost/Terminal	Total Net Cost/Year
1	1	13	251	3,260	68.9	896
	2	8	302	2,420	37.5	300
	3	8	319	2,550	-25.1	-201
2	1	2	661	1,320	172	344
	2	1	922	922	193	193
	2	10	13[c]	130	5.7[c]	57
4	3	1	18.0	18.0	-1.0	-1.0
	4	2	78.0	156	13.0	26.0
TOTALS		45[b]		10,776		1,614

[a] Case 1: New, modified, or reconstructed terminals in areas unaffected by SIP regulations (Table B-1).
Case 2: Modified or reconstructed terminals requiring bottom loading conversion (Table B-2).
Case 3: Terminals with existing SIP-level (80 mg/liter) control systems.
Case 4: New terminals installing NSPS-level equipment instead of SIP-level equipment.

[b] Remaining 10 of the 55 affected terminals will have previously installed equipment which meets 35 mg/liter.

[c] No replacement or add-on control are required for existing vapor processing systems under the promulgated standard. Only costs associated with the facilities would be for continuous monitors.

Table B-4 shows a nationwide total capital investment for the terminal industry in the first 5 years of $10.8 million, or 45 percent of the previous estimate. The net annualized cost in the fifth year will be $1.6 million, or 45 percent of the former figure.

The costs to the for-hire tank truck industry have increased slightly in the cost impacts re-evaluation. As stated in Section 2.9.4, approximately 370 for-hire tank trucks will require conversion due to the standard. Of these, 85 will require both bottom loading and vapor recovery retrofitting, at $6,400 per tank truck, and 285 will require only the addition of vapor recovery equipment, at $3,000 per tank truck (Section 2.5.5). The capital and annualized costs are calculated as in Sections 8.2.5.1 and 8.2.5.2 of BID, Volume I. The total capital investment in the first 5 years will be:

(85 tank trucks) x ($6,400/tank truck) = $544,000, plus

(285 tank trucks) x ($3,000/tank truck) = $855,000,

which totals $1.4 million. The annualized cost in the fifth year will consist of capital charges and the costs of maintenance and testing. Assuming an interest rate of 17 percent and an equipment life of 12 years, capital charges will total:

($1.4 million) x (24 percent) = $336,000/yr.

With maintenance costs at $1,000 per year and testing at $450 per year, the total annualized cost for 370 tank trucks in the fifth year will be:

370 x ($1,000/yr + $450/yr) + $336,000/yr = $0.9 million.

In summary, the total capital investment required by both the bulk terminal and for-hire tank truck industries in the first 5 years of the standard will be $12.2 million. The annualized cost for both industries in the fifth year will be $2.5 million. Section B.3

discusses the changes to the economic impact analysis resulting from the revised cost estimates.

B.3 ECONOMIC IMPACT ANALYSIS

Tables 8-43 through 8-53 of BID, Volume I, were revised to account for the current control costs presented in Section B.2.1, the current price of leaded regular gasoline, and a current level of investment costs. All monetary values in this section are specified in first quarter 1981 dollars; older values not updated through direct contacts were converted using the "Chemical Engineering Plant Index" (IV-J-14). Except for these three changes, all of the assumptions used in the calculations in BID, Volume I, remain the same.

The change in the price of leaded regular gasoline from $0.17 per liter to $0.29 per liter impacts the results presented in Tables B-5 through B-10 either indirectly as a change in after-tax profits or directly in the calculation of a maximum percentage price increase (see Sections 8.4.1.2.1 and 8.4.1.2.2 of BID, Volume I). The change in total investment costs impacts the results in all the tables except Table B-9, either indirectly through a change in CMLTD and depreciation or directly in the calculation of ROI (see Sections 8.4.1.2.1. and 8.4.1.2.2.2 of BID, Volume I).

It is not necessary to thoroughly explain and examine each of the individual Tables B-5 through B-10 since the methodology and results are similar to those in the original economic analysis. In general, the revised debt service coverage ratios are much higher for all regulatory alternatives and all model plants. The revised ROI's are also considerably higher for new facilities but only slightly higher for existing facilities. The revised maximum percentage price increases presented in Table B-9 are in addition slightly higher for all model plants (for comparison purposes see Tables 8-45 and 8-52 of BID, Volume I).

The general conclusions presented in Sections 8.4.1.2.4 and 8.4.1.3.5 of BID, Volume I, are thoroughly supported by the results in Tables B-5 through B-10. None of the model plants will encounter a debt service coverage problem, nor will the maximum price increase necessary to maintain pre-control profit rates be excessive. The worst possible case is a necessary 0.48 percent price increase for a 380,000 liter/day existing top-loading facility.

Table B-5. DEBT SERVICE COVERAGE RATIO FOR NEW FACILITIES
(Monetary Values in $000 1981)

	380,000 l/day			950,000 l/day			1,900,000 l/day			3,800,000 l/day		
	CA	TO	REF	CA	TO	REF	CA	TO	REF	CA	TO	REF
Baseline Facility												
Total Investment		2,900			4,500			6,600			10,900	
Long-Term Debt (LTD)		1,160			1,800			2,640			4,360	
Current Maturity LTD (CMLTD)		116			180			264			436	
Depreciable Assets		1,887			2,942			4,222			7,075	
After-Tax Profit		303			758			1,517			3,035	
Depreciation		180			284			395			706	
Cash Flow (CF)		483			1,042			1,912			2,741	
CF ÷ CMLTD		4.2			5.8			7.2			8.6	
Controlled Facility												
Total Investment[a]	3,159	3,232	3,170	4,818	4,751	4,786	6,942	6,860	6,895	11,362	11,201	11,299
LTD[b]	1,419	1,492	1,430	2,118	2,051	2,086	2,777	2,744	2,758	4,822	4,661	4,759
CMLTD[c]	142	149	143	212	205	209	278	274	276	482	466	476
After-Tax Profit[d]	271	262	264	738	709	737	1,528	1,460	1,533	3,096	2,962	3,106
Depreciation[e]	206	213	207	316	309	313	429	421	425	752	736	746
Cash Flow	477	475	471	1,054	1,018	1,050	1,957	1,881	1,958	3,848	3,698	3,852
CF ÷ CMLTD	3.4	3.2	3.3	5.0	5.0	5.0	7.0	6.9	7.1	8.0	7.9	8.1

[a] Baseline investment plus capital control costs.

[b] Baseline LTD plus capital control costs.

[c] 0.10 x LTD.

[d] Baseline after-tax profit minus [(1-tax rate) x annualized control costs].

[e] Baseline depreciation plus (0.10 x control capital costs).

Table B-6. DEBT SERVICE COVERAGE RATIO, EXISTING FACILITY -- BASELINE (Monetary Values in $000 1981)

	380,000 l/day	950,000 l/day	1,900,000 l/day	3,800,000 l/day
Existing Facility				
Total Investment[a]	1,960	3,050	4,470	7,380
Long-Term Debt (LTD)	780	1,220	1,790	2,950
Current Maturity LTD (CMLTD)	78	122	179	295
Depreciable Assets	1,280	1,990	3,260	4,810
After-Tax Profit[b]	303	758	1,517	3,035
Depreciation	128	199	326	481
Cash Flow (CF)	431	957	1,843	3,516
CF ÷ CMLTD	5.5	7.8	10.3	11.9

[a] Table 8-47 values from BID, Volume I adjusted to reflect 1976 cost levels using M&S equipment cost index (IV-J-14).

[b] Calculated using $0.29 per liter wholesale price for leaded regular gasoline. This assumes an average retail price of $0.356 per liter ($1.347 per gallon) for leaded regular as of the first quarter cf 1981.

Table B-7. DEBT SERVICE COVERAGE RATIO, EXISTING FACILITY-BOTTOM LOADED, NO SIP CONTROL (Monetary Values in $000 1981)

	380,000 l/day			950,000 l/day			1,900,000 l/day			3,800,000 l/day		
	CA	TO	REF	CA	TO	REF	CA	TO	REF	CA	TO	REF
Total Investment[a]	2,219	2,292	2,230	3,368	3,301	3,336	4,812	4,730	4,765	7,842	7,681	7,779
LTD[b]	888	917	892	1,347	1,320	1,334	1,925	1,892	1,906	3,137	3,072	3,112
CMLTD[c]	89	92	89	135	132	133	193	189	191	314	307	311
After-Tax Profits[d]	271	262	264	738	709	737	1,528	1,460	1,533	3,096	2,962	3,106
Depreciation[e]	154	161	155	231	224	228	360	352	356	527	511	521
Cash Flow (CF)	425	423	419	969	933	965	1,888	1,812	1,889	3,623	3,473	3,627
CF ÷ CMLTD	4.8	4.6	4.7	7.2	7.1	7.3	9.8	9.6	9.9	11.5	11.3	11.7

[a] Baseline investment plus capital control costs.

[b] Baseline LTD plus capital control costs.

[c] 0.10 x LTD.

[d] Baseline after-tax profit minus [(1-tax rate) x annualized control costs].

[e] Baseline depreciation plus (0.10 x control capital costs).

Table B-8. DEBT SERVICE COVERAGE RATIO, EXISTING FACILITY-TOP LOADED, NO SIP CONTROL (Monetary Values in $000 1981)

	380,000 1/day			950,000 1/day			1,900,000 1/day			3,800,000 1/day		
	CA	TO	REF	CA	TO	REF	CA	TO	REF	CA	TO	REF
Total Investment[a]	2,629	2,594	2,640	3,988	3,921	3,956	5,443	5,361	5,396	8,710	8,549	8,647
LTD[b]	1,449	1,414	1,460	2,158	2,091	2,126	2,763	2,681	2,716	4,280	4,119	4,217
CMLTD[c]	145	141	146	216	209	213	276	268	272	428	412	422
After-Tax Profits[d]	216	207	208	654	625	654	1,443	1,375	1,448	2,979	2,845	2,989
Depreciation[e]	195	191	196	293	286	290	388	380	384	614	598	608
Cash Flow (CF)	411	398	404	947	911	944	1,831	1,755	1,832	3,593	3,443	3,597
CF ÷ CMLTD	2.8	2.8	2.8	4.4	4.4	4.4	6.6	6.5	6.7	8.4	8.4	8.5

[a] Baseline investment plus capital control costs.

[b] Baseline LTD plus capital control costs.

[c] 0.10 x LTD.

[d] Baseline after-tax profit minus [(1-tax rate) x annualized control costs].

[e] Baseline depreciation plus (0.10 x control capital costs).

Table B-9. MAXIMUM PERCENTAGE PRICE INCREASES, COST PASS-THROUGH: NEW FACILITIES, EXISTING FACILITIES (BOTTOM LOAD), AND EXISTING FACILITIES (TOP LOAD)

(Percent)

	380,000 l/day			950,000 l/day			1,900,000 l/day			3,800,000 l/day		
	CA	TO	REF	CA	TO	REF	CA	TO	REF	CA	TO	REF
New and Existing Facilities (Bottom Load)	.16	.20	.19	.04	.10	.04	(.01)[a]	.06	(.02)[a]	(.03)[a]	.04	(.03)[a]
Existing Facilities (Top Load)	.43	.48	.47	.20	.26	.21	.07	.14	.07	.03	.09	.02

[a] ( ) indicates control cost savings, which may result in price reductions.

Table B-10. AFTER-CONTROLS, AFTER-TAX RETURN ON INVESTMENT: NEW FACILITIES, EXISTING FACILITIES (BOTTOM LOAD), AND EXISTING FACILITIES (TOP LOAD)

(Percent)

	380,000 l/day			950,000 l/day			1,900,000 l/day			3,800,000 l/day		
	CA	TO	REF	CA	TO	REF	CA	TO	REF	CA	TO	REF
New Facility												
Baseline		10.4			16.8			23.0			27.8	
After-Control	8.6	8.1	8.3	15.3	14.9	15.4	22.0	21.3	22.2	27.2	26.4	27.5
Existing Facility (Bottom Loaded)												
Baseline		15.0			15.0			15.0			15.0	
After-Control	11.9	11.7	11.5	13.7	13.4	14.0	14.6	14.0	14.7	15.0	14.4	15.0
Existing Facility (Top Loaded)												
Baseline		15.0			15.0			15.0			15.0	
After-Control	8.0	7.8	7.7	10.9	10.6	11.0	13.0	12.5	13.1	13.8	13.3	13.9

The conclusions based on the ROI analysis are also the same with the exception of a new 950,000 liter/day facility. The conclusion based on the original ROI analysis stated that "terminals in the 950,000 liter/day category, marginally attractive before controls, would have to pass through most of the control costs to remain attractive." The ROI results from Table B-10 suggest that a new 950,000 liter/day facility will be marginally attractive for both the baseline and after-control cases since the 15 percent ROI criterion is maintained. The ROI results still support the conclusion that growth in the form of 380,000 liter/day bulk terminals will not take place because both pre-control and after-control ROI's do not meet the 15 percent condition. The 380,000 liter/day existing terminal will still encounter an ROI of less than 11 percent, the minimum acceptable return, but the 950,000 liter/day existing terminal now maintains a marginal ROI level of between 10.6 and 11.0 percent.

The economic impacts on the for-hire tank truck industry are slightly higher as a result of the revised costs; however, the basic conclusions from the original analysis remain intact. Revised rates of return on transportation investment decrease slightly to a range of 3.9 to 11.0 percent for Scenario 1, and a range of 2.8 to 10.2 percent for Scenario 2. These results further support the original conclusion that the viability of the three largest firms could become threatened with the imposition of any of the regulatory alternatives in the unlikely event that control costs are totally absorbed. If, however, the control costs are fully passed through to the consumer in the form of higher prices, gasoline prices would increase by a maximum of 0.02 to 0.08 percent. As discussed in Section 2.5.7, tank truck firms are expected to be able to pass through their costs of control. Finally, the firm's ability to meet debt service costs is maintained since the values calculated in the revised debt service coverage analysis remain the same as those presented in Table 8-59 of BID, Volume I.

B.4 SOCIOECONOMIC AND INFLATIONARY IMPACTS

Section B.3 presented the revisions to the original economic analysis for the bulk terminal and for-hire tank truck industries. This section will review the results of the original Socioeconomic and

Inflationary Impacts section (Section 8.5 of BID, Volume I) with respect to the directives of Executive Order 12291 and the updated scenario presented in Section B.3, to determine whether the results and conclusions of the original analysis have changed.

B.4.1 Executive Order 12291

According to the directives of Executive Order 12291, a "major rule" means any regulation with the potential to result in:

- an annual effect on the economy of $100 million or more,
- a major increase in costs or prices for consumers, individual industries, Federal, State, or local government agencies, or geographic regions, or
- significant adverse effects on competition, employment, investment, productivity, innovation, or on the ability of the United States-based enterprises to compete with foreign-based enterprises in domestic or export markets.

The following sections evaluate these criteria in relation to the promulgated action.

B.4.2 Fifth-Year Annualized Costs

Section B.2.2 recalculated fifth-year annualized costs to be $1.6 million for the bulk terminal industry and $0.9 million for the for-hire tank truck industry. The total of $2.5 million is well within the $100 million level; thus, no major impact is indicated according to this criterion.

B.4.3 Inflationary Impacts

In Section B.3 it was determined that the worst case impact the regulatory alternative would have on the price of gasoline, via the bulk terminal industry, was 0.48 percent. In Section 8.4.2.2.2 of BID, Volume I, it was also determined that the worst case impact the regulatory alternative would have on the price of gasoline, via the for-hire tank truck industry, was 0.07 percent. The total worst case impact on the price of gasoline from both industries is 0.55 percent. Since a rise in the price of gasoline by 0.55 percent cannot be considered a major price or cost increase, no major economic impact is indicated according to this criterion.

B.4.4. Other Impacts

The regulatory alternative will not curtail a businessman's opportunity to enter the gasoline terminal market. Sufficient ROI's are available to make it attractive to build large terminals in both pre-control and post-control situations. At the other extreme a small businessman is already limited by the lower returns from small facilities in a pre-control situation. For smaller existing terminals low ROI's may make closure a necessary alternative; however, few facilities will find themselves in a position of being unable to pass along most of the control costs. Therefore, employment impacts and adverse effects on the regional economies will be negligible.

Finally, foreign trade and the balance of payments should not be influenced by the standard, since bulk terminals export and import relatively small amounts of gasoline. No major impact is indicated according to this criterion.

B.5 REGULATORY FLEXIBILITY ANALYSIS

The Regulatory Flexibility Act of 1980 (RFA) requires that differential impacts on small businesses resulting from all Federal regulations be identified and analyzed. The definition of a small business in the bulk terminal industry (SIC 5171), according to the criterion to qualify for SBA loans, is a firm with less than $22 million in annual receipts (IV-E-47). Approximately 50 to 60 percent of the bulk terminal industry can be considered as small businesses according to this criterion (IV-J-13). In the for-hire tank truck industry (SICs 4212, 4213, and 4214) a small business is defined as a firm with less than $6.5 to $7 million in annual receipts (IV-E-47). Approximately 60 percent of the for-hire tank truck industry can be considered as small businesses according to this criterion (IV-J-12). The RFA further stipulates that the analysis must be prepared if 20 percent of the small businesses are significantly affected.

As described in Section B.2.2, five new terminals are expected to be constructed in the first five years, and approximately 50 facilities will become affected through modification or reconstruction. Of the 55 affected facilities, 15 facilities, a 27 percent share, can be considered small business entities (assuming Model Plant 1 approximates a small business), and so the 20 percent criterion is exceeded.

Only the modified and reconstructed category of the affected facilities need be examined for significant impact since the five new terminals are all medium to large sized plants. New small facilities are considered not economically feasible (based on stand-alone economics), with or without imposition of the promulgated standards. The 15 affected facilities considered to be small business entities will be impacted according to the costs presented in Table B-2 for top-loaded, existing bulk terminals. The analysis presented in Section B.3 concluded that a significant impact for small business entities (assumed to be Model Plant 1) would occur only under the worst-case assumption of complete cost absorption. Under a more likely scenario, further analysis revealed no significant impact. This conclusion was based on the more realistic assumption that most of the costs will be passed through with very little cost absorption affecting the ROI. Small terminals in remote areas will be at the same disadvantage with respect to parts and service access as they were prior to the standards, but this should not affect their ability to comply with the standards at a reasonable cost. Since the impact on small bulk terminal businesses is not expected to be significant, no Regulatory Flexibility Analysis is required for this industry sector.

Thirty-four model firms in the for-hire tank truck industry are expected to be affected by 1985. Twenty-three of these affected firms are expected to be small business entities, representing a 68 percent share, which exceeds the 20 percent criterion.

The potential exists for a significant impact to occur in a worst-case scenario if control costs are completely absorbed. The results from the return-on-transportation investment (ROTI) analysis, Section 8.4.2.2.1 of BID, Volume I, not only suggested a significant worst-case impact, but that the impacts are more severe for the largest model trucking firms. The decrease for the worst-case situation in the ROTI's range from 9.6 and 55.6 percent. A more likely scenario was analyzed and no significant economic impact was found. This scenario was based on the realistic assumption that most of the control costs will be passed through with very little cost absorption affecting the ROTI. Even under complete cost pass-through the price of gasoline increases at most by 0.03 percent. Since the impact on small independent tank truck firms is not expected to be significant, no Regulatory Flexibility Analysis is required for this industry sector.

B.6 REFERENCES

IV-D-51[b] Letter and attachments from Schmidt, E.L., McGill, Incorporated, to Norton, R.L., Pacific Environmental Services, Incorporated. April 30, 1981. Information on prices and power consumption for vapor processors.

IV-E-3 Telecon. LaFlam, G.A., Pacific Environmental Services, Incorporated, with Edwards, R., Edwards Engineering Corporation. February 23, 1981. Information on refrigeration units.

IV-E-20 Telecon. LaFlam, G.A., Pacific Environmental Services, Incorporated, with Kaitschuck, J., John Zink Company. April 14, 1981. Information on carbon adsorption units.

IV-E-22 Telecon. Gschwandtner, K.C., Pacific Environmental Services, Incorporated, with Todd, J., Heil Company. April 14, 1981. Information on tank truck conversion costs.

IV-E-24 Telecon. Gschwandtner, K.C., Pacific Environmental Services, Incorporated, with Hemphill, R., Fruehauf Corporation. April 20, 1981. Information on tank truck conversion costs.

IV-E-25 Telecon. Gschwandtner, K.C., Pacific Environmental Services, Incorporated, with Botkin, L., Fruehauf Corporation. April 20, 1981. Information on tank truck conversion costs.

IV-E-26 Telecon. Gschwandtner, K.C., Pacific Environmental Services, Incorporated, with Ritterbush, J., J & L Tanks. April 20, 1981. Information on tank truck conversion costs.

IV-E-27 Telecon. LaFlam, G.A., Pacific Environmental Services, Incorporated, with Kirkland, J., Hirt Combustion Engineering. April 20, 1981. Information on cost of compression-oxidation vapor control units.

IV-E-30 Telecon. Norton, R.L., Pacific Environmental Services, Incorporated, with McGill, J., McGill, Incorporated. April 23, 1981. Information on carbon adsorption units.

IV-E-32 Telecon. LaFlam, G.A., Pacific Environmental Services, Incorporated, with Edwards, R., Edwards Engineering Company. April 28, 1981. Information on refrigeration units.

IV-E-33 Telecon. LaFlam, G.A., Pacific Environmental Services, Incorporated, with Welpe, B., Hunn Corporation. April 29, 1981. Information on cost of loading rack conversions.

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[b] These numbers correspond to the docket item number in Docket No. A-79-52.

IV-E-35 Telecon. LaFlam, G.A., Pacific Environmental Services, Incorporated, with Bitterlich, G., National Airoil Burner Company. April 30, 1981. Information on cost of thermal oxidizer units.

IV-E-36 Telecon. Schmidt, E., McGill, Incorporated, with Norton, R.L., Pacific Environmental Services, Incorporated. April 30, 1981. Information on carbon adsorption units.

IV-E-37 Telecon. Guischard, C., AER Corporation, with LaFlam, G.A., Pacific Environmental Services, Incorporated. May 4, 1981. Information on cost of thermal oxidizer units.

IV-E-38 Telecon. Lowery, E., ARCO, with LaFlam, G.A., Pacific Environmental Services, Incorporated. May 5, 1981. Information on maintenance and electrical costs of Edwards DE Model refrigeration unit.

IV-E-39 Telecon. LaFlam, G.A., Pacific Environmental Services, Incorporated, with Ottoson, R.S., Ray Construction Company, Incorporated. May 6, 1981. Information on design and costs associated with loading rack conversions.

IV-E-47 Telecon. Cryer, C., JACA Corporation, with Sheirik, K., Small Business Association. June 17, 1981. Size criteria for small businesses.

IV-J-5 California Air Resources Board. Certification Evaluation Report No. C-9-058 of Hirt Vapor Recovery Unit. August 1980.

IV-J-8 Edwards Engineering Corporation. Hydrocarbon vapor recovery units price list. January 1, 1981.

IV-J-12 American Trucking Associations, Incorporated. 1978 Motor Carrier Annual Report--Financial and Operating Statistics. Washington, D.C. 1979. 812 p.

IV-J-13 Robert Morris Associates. Annual Statement Studies. 1980. p. 217.

IV-J-14 Chemical Engineering. McGraw-Hill, Inc. May 18, 1981. p. 7.